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LEODICIDAE OF THE WEST INDIAN REGION

By
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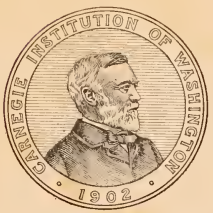

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Outline map showing area covered by the investigations described.

LEODICIDAE OF THE WEST INDIAN REGION.

INTRODUCTION.

Species of the West Indian Leodicidæ have been described by Baird (1870), Schmarda (1861), Grube (1856 and 1857), Pourtales (1863–1869), Webster (1884), McIntosh (1885), Ehlers (1887), Augener (1906), Verrill (1900), and Treadwell (1901, 1911, 1917). Grube and Verrill published no figures, and while the papers by Ehlers and Augener are well illustrated, it is evident that much of their material was not well preserved. Moreover (with the exception of Verrill, who gave no figures), dealing as they did solely with preserved material, they were unable to record the character of the living coloration, often so brilliant in this family. It was, therefore, with especial pleasure that I availed myself of the opportunity offered by the Director of the Department of Marine Biology of the Carnegie Institution of Washington to undertake a systematic study of the family, basing my account on living specimens. With the aid of artists generously provided by the Department I am able to give water-color drawings of the living animals in practically all of the species described, though in a few cases, owing to the too rapid accumulation of material or for other reasons, it was not possible to do this. With the exception of two species (see pages 76 and 125), the descriptions are based on my own collections. I have also studied the collections of the American Museum of Natural History in New York City, of the Museum of Yale University, the Museum of Comparative Zoölogy at Harvard University, and the United States National Museum in Washington. My own collections were made at the Dry Tortugas and Key West region of Florida, and in Bermuda, Porto Rico, Montego Bay, Jamaica, and Tobago. The locations of the stations where collecting was done are shown by the map on the opposite page.

I am indebted to Dr. Paul Bartsch for the opportunity of studying the collections at the United States National Museum; to Director Samuel Henshaw for access to Ehlers's types at the Museum of Comparative Zoölogy, and to Dr. R. V. Chamberlin for assistance in their study; to Director E. L. Mark for the privileges of the Bermuda Biological Station during the season of 1916, and to Dr. W. J. Crozier, resident naturalist at the station, for many courtesies; to Professor A. E. Verrill for the loan of his Bermuda collections, containing a number of types, and to the Library of the American Museum of Natural History (through its Librarian, Dr. R. W. Tower) for literature. Especial acknowledgment is made to Dr. Alfred Goldsborough Mayor, Director of the Department of Marine Biology of the Carnegie Institution of Washington, for putting at my disposal the material resources of his laboratory.

Following a method devised by Dr. Mayor, the animals were first narcotized in a solution of $MgSO_4$, 154 grams to the liter, and killed in 5 per cent. formalin. As soon as dead they were transferred to 90 per cent. alcohol until hardened, and then run down to 70 per cent., to be subsequently returned to 90 per cent.

Preservation in formalin gives very poor results with annelids, and the strong alcohol is more satisfactory than the lower grades. My collecting was done along shore or in comparatively shallow water, so that I did not see some of the deeper-water forms described by Ehlers.

In the drawings the scale of magnification is given after the legend. It should be remembered that in annelids the size of individual organs varies with the degree of expansion of the animal, and there is often variability in the size of adult animals of the same species. All text-figures except 53 and 287 were drawn with the camera lucida. In the preparation of the colored illustrations I had the assistance of Messrs. K. Morita, S. C. Ball, S. C. Rowland, R. Weber, Duncan Gay, and Miss Helen Fernald.

CLASSIFICATION.

Originally classified as *Nereis*, the principal genus of this family was first recognized as distinct by Cuvier (1817, pp. 524 and 525), who named it *Eunice* and subdivided "Les Néréides" into "Les Néréides proprements dits" and "Les Euniciens." These were soon separated from *Nereis* under the family name *Eunicidæ*, by which they have since been known. Verrill, however (1900, p. 638), showed that the name *Eunice* was in use in 1816 for a genus of insects, and the law of priority requires us to abandon it for the annelids. This leaves the name *Leodice* given by Savigny (1820, p. 13) as the true name of the genus and correspondingly of the family.

The *Leodicidæ* are a well-defined family in which the most constant structures are internal rather than external. To the practised eye the general appearance of the animals is quite characteristic, though in the presence or absence of appendages there may be a very great amount of variation. There is always a well-developed jaw apparatus, composed of bilaterally arranged series of chitinous plates developed in a pharyngeal pouch, and capable of protrusion for feeding purposes through the mouth. The structure of these jaws was used by Ehlers as a basis for classification, though the external organs are a more convenient means of recognition.

In the present paper I have employed for identification certain characters which I have found reasonably constant, though all subject to more or less individual variation. All of the external characters except the form of the setæ are liable to distortion through the action of the preserving fluids, which increases the difficulties in the way of basing accurate descriptions on preserved material. I believe that the preserving methods I have used reduce this difficulty to a minimum, and in all but a few species the living animal has been studied. An explanation of the characters employed will render the later descriptions more intelligible.

1. *Size and color:* While size variations do occur, and in the poorly preserved material frequently sent to the systematist for study are often much exaggerated by the action of the preserving fluids, I did not find the range of variation extreme in the living, mature animals. Differences of size are perhaps more variable than other characters, but are of diagnostic importance. In most species the color of the living animal is characteristic, though obviously this depends on whether the

color is due to pigmentation or to the blood. The body (especially in the forms with little pigment) is tinted red by blood and when there are large gills filled with blood they give the surface a bright-red color which disappears after preservation. If two species have this same structure, their color differences are negligible. Pigmented species, on the other hand, are easily distinguishable, though the pigmentation is not always retained after preservation.

2. *Prostomial structures:* It is customary to speak of the prostomium as the "head" of the animal. Even if it were accurate to designate as the "head" a portion which does not surround the mouth, it leads to accuracy of description if we speak of the "head" as the anterior end of the body, making a distinction between the prostomium and the peristomium. The prostomium is a rounded lobe overhanging the mouth, and to which appendages may be attached. In the *Leodicidæ* these appendages are the palps and the tentacles. The former when typically developed are fleshy appendages attached to the lower anterior surface of the prostomium. The latter are more or less elongated slender appendages attached to the posterior dorsal surface of the prostomium. In a few genera (see *Onuphis*, plate 7, figure 2) a pair of rounded processes arise from the anterior margin of the prostomium and are generally known as the "frontal tentacles." Pruvot (1885, p. 261), in connection with work on the central nervous system of the *Leodicidæ*, studied the innervation of these organs in *Hyalinœcia* and decided that their nerve supply indicates that they are homologous with the palps rather than with the tentacles. The palps are most in evidence in *Stauronereis* (plate 9, figure 21), where they are long, rather heavy, and more or less wrinkled. It seems evident that a bilobed condition of the anterior margin of the prostomium, whenever it occurs in other *Leodicidæ*, arises from a fusion of the palps with the anterior margin of the prostomium, the degree of the lobing varying inversely with the amount of the fusion. In the *Lumbrinereinæ* there is never any trace of a lobing.

In some species of *Leodice* the prostomium has a four-lobed character, the halves being each subdivided into an inner and an outer lobe, the former the smaller. Pruvot and Rachovitza (1895, p. 416) assert that the innervation of these two lobes indicates that the larger is the palp and the inner is homologous with the frontal tentacle of such genera as *Onuphis*. On the posterior margin of the prostomium there may be seven, five, three, one, or no tentacles. Since we may have at one end of the scale no prostomial appendages and at the other as many as nine (including the palps), the question arises as to which was the primitive condition. Does the four-lobed character in some *Leodice*, for example, represent the first stages in the development of palps and frontal tentacles such as appear in *Onuphis*, or has there been a fusion of appendages, and do the *Lumbrinereinæ* represent the latest stage in this process? In the general character of its body and the structure of its jaw *Stauronereis* seems to be more primitive than the others, so that I believe (lacking embryological evidence bearing on this question) that, in so far as the palps are concerned, there has been a fusion. If we regard *Stauronereis* as a primitive form, we must assume that in the matter of tentacles the evolution of the family was in two directions. Eyes are usually present near the posterior border of the

prostomium, or, as in *Leodice*, lying near the bases of the tentacles, and a sensory or "nuchal" organ in the form of a shallow pit lies on either side near the posterior prostomial border, and usually is covered by the anterior margin of the peristomium. Practically all of the details of prostomial structure mentioned (except *number* of tentacles) vary in the living animal with the degree of expansion, and in preserved material with the excellence of the preservation.

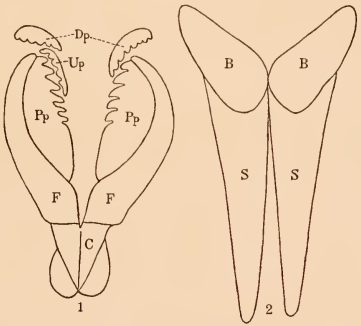
3. *Peristomial structure:* The peristomium or first somite surrounds the mouth and its anterior margin may, if the animal is contracted, partly cover over the posterior portion of the prostomium. It is usually longer than the second somite, its size being a feature of diagnostic value. It is closely connected to the second somite, and there may be more or less of a fusion of the two, especially on the dorsal surface. This has led to the description of some species as having a biannulate first somite, or in other cases to the statement that only one somite is without parapodia. So far as my observations go, the two first somites are without parapodia, but in some cases they are so nearly fused as to look like one. In *Lumbrinereis* the ventral anterior border of the second somite is prolonged to form the posterior margin of the mouth. The second somite may bear nuchal cirri, whose presence or absence (and if present, their form and size) is of diagnostic value. In *Onuphis* (plate 7, figure 2) it looks as if the nuchal cirri were carried on the first somite. I think that it indicates a fusion of the first two somites. The question might perhaps be settled by a study of the nerve distribution, which I think has not been done for this genus. Pruvot (1885) found that the innervation in *Leodice* demonstrates that the ring carrying the nuchal cirrus is a true somite, and that the innervation of the nuchal cirrus indicates that it is homologous with the dorsal parapodial cirrus.

4. *The parapodia:* These are of the type called "sesquiramous" by Pruvot and Rachovitza (1895, p. 346), since the hæmal lobe has entirely disappeared, its position being indicated by a tuft of very small seta-like aciculæ which extend into the base of the dorsal cirrus. The parapodium has a setal lobe with one or more aciculæ, to which is usually added toward the posterior end of the body a large acicula-like structure extending into the ventral portion of the parapodium and protruding to the surface just dorsal to the ventral cirrus. This has been called a ventral acicula, but Pruvot and Rachovitza assert (1895, p. 419) that to call it an acicula assumes that the parapodium has a third (ventral) lobe, which does not occur in any annelid, and that it is really the ventralmost seta, which it usually resembles in having a hood, though in other respects it is like an acicula. They propose to call this an "acicular seta," and this nomenclature has been followed by Fauvel (1914 and 1917). I am unable to agree with this interpretation, since this structure does not arise with the seta bundle but with the other aciculæ. It seems to me to be merely an acicula which has come to the surface ventrally to the others. It is, to be sure, hooded, but the ordinary hooded seta is *compound*, so that the resemblance is not close. The form of the setal lobe and the character of its lips are of diagnostic value, as are also the forms of the dorsal and ventral cirri, though these are not present in all genera.

5. *The gills:* These are usually attached to the dorsal cirrus, but in some cases they arise on the body wall dorsal to this. Their form and mode of branching, as well as their distribution over the body, are quite constant within the limits of a species.

6. *The setæ:* Three forms of setæ occur, *simple, compound,* and *pectinate,* the latter being characteristic of the family. The simple setæ are always slender and sharp-pointed, sometimes with a "wing" or "fin" along one or two edges. In some cases this wing is really two flattened expansions diverging and making an acute angle with each other from the side of the shaft. Whether this is always the case I can not say, but it seems probable that it is. Sometimes, also, it is clear that what appear as wings on opposite sides of the shaft are really these two parts of the wing which, instead of appearing in profile and therefore looking like one, are seen in half or full face. The compound seta is usually toothed at the end and covered by a "hood," which in reality is a pair of thin plates lying one on either side of the apex of the terminal joint. When seen in profile, which is their usual position under the microscope, this looks like a covering of the entire end. In *Marphysa,* compound setæ occur whose terminal joints are not toothed and do not have a hood. The pectinate setæ are much broadened and flattened toward the end, this flattened part being more or less curved to form a scoop-shaped portion whose margin is drawn out into a number of very delicate, sharp-pointed teeth.

7. *The anal cirri:* Usually characteristic in form and size in any species.



1. Diagram of Leodicid maxilla. 2. Diagram of mandible.

8. *The jaws:* While regarded by some students of the family as too variable in individuals and too similar in different species to be of value in classification, I have found that while such details as the number of teeth in a plate may vary, the general appearance and the arrangement of parts of these structures are decidedly characteristic in any species. Especially in the jaw of *Leodice* there is apt to be confusion in following the description without some definite plan of nomenclature, and in the descriptions I have followed the scheme indicated in

text-figures 1 and 2. The dorsal plates are called the "maxilla," the ventral the "mandible." The basal portion of the maxilla I shall call the "carrier," *C*, which supports a bifid plate, the "forceps," *F*. Next to these come the "proximal paired plates," *Pp*, with the "distal paired plates," *Dp*, beyond the tips of the forceps. The "unpaired plate," *Up*, lies at the end of the left proximal paired. Lateral to the distal paired plates are usually smaller accessory plates which are apparently of minor importance in classification. The mandible is composed of two shafts, *S*, each with a terminal beveled portion, *B*. In other genera the jaws may differ decidedly from those in *Leodice*, but this nomenclature will be easily adapted to these cases.

As is perhaps to be expected in a family so varied as the *Leodicidæ*, a considerable number of genera have been described, some of them apparently from imperfect or badly preserved specimens, so that a revision of the genera seems desirable. It is, however, evident that an accurate revision could follow only a renewed examination of all type specimens, which is doubtless impossible and certainly impracticable at present. I shall attempt, therefore, only such revisions as are made possible by a study of the actual specimens or by a review of the literature where evident errors have been made in the application of the laws of priority. The description of each genus will be taken up in connection with its particular species.

In the matter of the larger divisions, the system has been much modified from time to time. Audouin and Milne Edwards (1834, p. 136) subdivided the family "*Eunicians*" into "branchiate" and "abranchiate" forms, distinguishing three genera under the former and four under the latter head, and this same classification was adopted by Grube (1851, p. 122) and by Johnston (1865, p. 129). Kinberg (1864, pp. 559 to 574) divided the *Eunicea* into three parts, depending on the form of the jaws, the first part having eight families, each of the other two having one family. Schmarda (1861, p. 114) separated the *Lumbrinereidæ* from the *Eunicidæ*, the former generally without gills, the latter always having them. de Quatrefages (1865*b*, p. 287) used this same arrangement. Ehlers (1864–1868, pp. 280–282) proposed a classification based on jaw structure. While later writers have not adopted this in its entirety, his terminology has been in part retained and it will be instructive to give it here.

Family EUNICEA

Eunicea labidognatha.
Plates of upper jaw dissimilar in form, the small terminal plates in half circle around the end of the forceps. Parapodium uniramous, with several forms of setæ.

Eunicea prionognatha.
Plates of upper jaw in rows and more or less alike in form. Parapodia, one branched with one form of seta or two branched with two forms.

Eunicea lab. tentaculata.
An unequal number of plates in the two sides of the jaw. Always with tentacles.

Eunicea lab. nuda.
An equal number of plates in the two sides of the jaw. No tentacles.

Eunicea prio. monocopa.
Parapodium one branched with simple setæ.

Eunicea prio. dicopa.
Parapodium two branched with both simple and compound setæ.

It will be noted that genera superficially as unlike as *Onuphis* and *Lumbrinereis* would be grouped together because of their jaw structures, while those superficially as similar as *Lumbrinereis* and *Arabella* would be separated. Claperède (1870, pp. 386–390) objected to Ehlers's arrangement on the ground that the jaws have too variable a character to be used in this fashion. Later (1887, pp. 64–69) Ehlers, though retaining his main divisions, admits that it is often difficult to say in which one certain genera should be placed. His statement that *Stauronereis* has a two-branched setal lobe in its parapodium is based on his observation of *S. rubrovittatus* (1864–1868, plate XVIII, figure 3), but Pruvot and Rachovitza (1895, p. 359) assert, after an examination of this species, that Ehlers's observations were inaccurate. This does not necessarily mean that *Stauronereis* does not belong in a different group from the other *Leodicidæ*, but merely that Ehlers's criterion was not well chosen. Grube (1878*b*, pp. 79–106, and 1879, pp. 78–115) classifies the family as follows:

Family EUNICEA.

1. *Labidognatha.* Characters essentially the same as Ehlers's *Eunicea lab. tentaculata.*
2. *Lumbriconereidæ.* Maxillæ in two long rows, the hindmost a forceps. Parapodium uniramous, with simple setæ, though compound ones may occur in anterior somites. Gill, ventral cirri, long dorsal cirri, tentacles and subtentacles are lacking. Eyes seldom present.
   - Group 1. With flattened leaf-like dorsal cirrus.
   - Group 2. With no dorsal cirrus.
3. *Staurocephalidæ.* Maxillæ in two long rows on either side, very small and numerous, the posterior one not a forcep. Parapodium uniramous. Simple and compound setæ, 2 tentacles and 2 palps. With dorsal and ventral cirri, and no gills. Eyes two pairs at most.

Kinberg (1864, pp. 559–574) gave as the first family of his *Eunicea* the *Onuphiæa*, which he distinguished from the *Eunicea* proper by the possession of two antennæ and two palps which are not represented in the former, the family *Eunicea* forming his second family. By a number of later writers the *Onuphididæ* have been given the rank of a family. Thus McIntosh (1885) divides the group into: 1, *Staurocephalidæ;* 2. *Lumbrinereidæ*; 3, *Eunicidæ;* 4, *Onuphididæ.* The chief characteristics separating the last two families are the possession of the frontal tentacles or frontal palps by the *Onuphididæ.* This classification has been abandoned by most recent writers, who include such genera as possess these frontal structures with the *Eunicidæ.* In his later work, McIntosh (1910) does not follow his former method, though he gives on page 403 the subfamily *Onuphididæ*, under which he arranges all of the genera usually put in the *Eunicidæ* as well as the *Onuphididæ.* I find it difficult to follow the reason for his arrangement in this paper, which is as follows:

Family *Eunicidæ* (p. 343).
Staurocephalidæ.
Eunice priognatha dicopa (Ehlers 1869) (p. 350).
Eunicea labiodgnatha nuda (p. 368). Under this he describes *Lumbriconereis.*
B. Eunicea priognatha.
B. 1. *Eunicea priognatha monocopa* (p. 392). Under this he describes *Arabella* and *Drilonerie*s. could not find any A to correspond with the B of this heading.
Subfamily *Onuphidæ* (p. 403). Under this he describes *Diopatra, Onuphis, Eunice, Hyalinœcia,* and *Nematonereis.*

Gravier 900, p. 217) reaches essentially the same results as Grube, though he objects to the use of the maxilla for classification on the ground that it may be broken and is therefore not a constant feature. His classification is as follows:

Family EUNICEA.
- One dorsal and one ventral cirrus.
  - Upper jaw of a few pieces, generally three. *Eunicidæ.*
  - Upper jaw of numerous small teeth arranged longitudinally. *Staurocephalidæ.*
- No ventral cirrus.
  - Dorsal cirrus rudimentary or foliaceous. *Lumbriconereidæ.*

Though based on different anatomical characters these two classifications of Grube and of Gravier agree in the content of their different subdivisions and they seem to me perfectly satisfactory. Making certain verbal changes, I would adopt them as follows:

Family LEODICIDÆ.

Annelida varying very much in size, with or without prostomial appendages, eyes, nuchal and parapodial cirri. Two or four anal cirri present. Parapodial gills present or absent. Parapodium sesquiramous. Jaw apparatus of maxilla and mandible, the former of two or more rows of plates, mostly toothed.

Subfamily *Leodicinæ.*

With dorsal and ventral parapodial cirri, with or without nuchal cirri and parapodial gills. Prostomium with from one to seven tentacle-like appendages, and one pair of palps more or less fused with the prostomium. Maxillary plates unlike on the two sides.

Subfamily *Lumbrinereinæ.*

Ventral cirrus absent. Dorsal cirrus rudimentary or foliaceous. No appendages or gills but with anal cirri. Maxillary plates alike on the two sides.

Subfamily *Stauronereinæ.*

With dorsal and ventral parapodial cirri but without nuchal cirri and gills. Palps long and not fused with the prostomium. One pair of tentacles. Jaw of one to three rows of toothed plates on either side united at their bases their ends diverging to form a V.

The following key applies only to the genera described in this paper.

Subfamily *Leodicinæ.*

A. With gills.
  a. With five tentacles.
    1. With tentacular cirri ..... *Leodice.*
    2. Without tentacular cirri ..... *Marphysa.*
  b. With seven tentacles. (Or five tentacles and two frontal palps), and tentacular cirri .... *Onuphis.*
B. Without gills.
  a. With five tentacles.
    1. Tentacular cirri present ..... *Nicidion.*
    2. No tentacular cirri ..... *Paramarphysa.*
  b. With three tentacles. No tentacular cirri ..... *Lysidice.*
  c. With one tentacle ..... *Nematonereis.*

Genus LEODICE Savigny.

J. C. Savigny, Système des Annélides, etc., 1820, p. 13.

Prostomium two- or four-lobed, the lobing often obscure. With five tentacles and one pair of eyes, the latter situated between the bases of the inner and outer paired tentacles. A pair of nuchal cirri on the second body somite. Parapodia begin on the third somite. Gills on a greater or lesser number of somites, situated on or near the dorsal cirrus. Jaw apparatus of maxilla and mandible, the former with forceps and two pairs of toothed plates, with an unpaired toothed plate on the left. Smaller accessory plates terminal to the toothed. Mandible of two symmetrical halves joined anteriorly, their anterior border apparently forming a beveled cutting edge. One or two pairs of anal cirri, in the latter case the pairs often very unequal in size.

I have earlier given the reason why the old name *Eunice* should be changed to *Leodice*. By various writers the genus has been subdivided, following Grube (1878[b], p. 98), who based the division on the form of the prostomium, putting those with a four-lobed prostomium in the subgenus *Eriphyle* (Kinberg, 1864, p. 561), while those with a two-lobed prostomium were put in the subgenus *Leodice* (Savigny, 1820, p. 13). Gravier (1900) uses the same terminology, but because the frontal lobes are often very indistinct he bases the division on the form of the gill, under *Eriphyle* those having gills of one filament more or less reduced, and under *Leodice* those with pectinate or arborescent gills. If this supposes that a four-lobed prostomium and simple gills occur together, the observations I have made on the West Indian genera do not bear out his hypothesis. The two in which there is the least gill development, *L. caribœa* and *L. denticulata*, have a markedly two-lobed prostomium. I see no reason, from a study of the material I have, for subdividing the genus. If I were to attempt such a division, I should start it with *L. caribœa* with its extremely feeble gill development and its very peculiar mandible, allying it with *L. siciliensis* of European waters and with *L. paloloides* of California (Moore, 1909, p. 246). Gravier (1900) made a similar suggestion, that the peculiar "facies" of *L. siciliensis* distinguished it from all other species and should be made the basis of a distinct subgenus.

The genus includes the largest members of the family, and, in fact, the largest polychaete annelids known.

Leodice longicirrata Webster.

(Plate 1, figures 1 to 4; text-figures 3 to 12.)

Eunice longicirrata Webster, 1884, p. 318, plate 12, figures 75–80.
Eunice articulata Ehlers, 1887, p. 83, plate 24, figures 8–10.
Eunice articulata Treadwell, 1901, p. 196.
Eunice articulata Augener, 1906, p. 130.
Leodice elegans Verrill, 1900, p. 640.
Leodice margaritacea Verrill, 1900, p. 644.
Eunice vittata Delle Chiaje var? McIntosh, 1885, p. 276, plate XXXVIII, figures 3, 4, 5; plate XIX A, figures 16, 17.

A medium-sized species, one of 194 somites being 237 mm. long, 4 mm. wide at the anterior end.

Anteriorly (plate 1, figures 1 to 3), each somite except the ninth is marked along its anterior border by a brown band, more or less of the posterior border being uncolored. The prostomium is four-lobed, and the greater part of its dorsal surface is covered by a brown pigment, leaving a circular colorless patch on its dorsal median surface and a much smaller patch on either side, near the outer paired tentacle. This pigment is continued toward the ventral surface in three lines, one median and one on either side between the head lobes. The basal portion of each tentacle is colored, this coloration being continued to a very slight extent on to the first tentacle joint. The apices of the

prostomial lobes are uncolored, but there is a colored area between the lobes on the ventral surface.

The tentacles (plate 1, figure 2) are long, the median unpaired extending as far as the eighth somite. The inner paired are rather more than three-quarters as long as the unpaired, the outer paired about half as long as the median. All of the tentacles are jointed, becoming moniliform toward the tip, their ground-color pure white, but with brown or purple bands at all constrictions. There is one pair of black eyes, situated at the bases of the inner paired tentacles.

The peristomium (plate 1, figure 2) is longer than the prostomium, with a narrow dorsal collar extending over the base of the latter. The anterior edge of this collar is colored, but, as is shown only if it is extended, its posterior edge is colorless. The surface of the peristomium is colored much like that of the prostomium, with a light-brown pigment, and is iridescent. The second somite is colorless, and later somites are brown with larger or smaller white areas. In the specimen figured, somite 5 had only a very narrow anterior colorless band, somites 2 and 9 were entirely uncolored, and somite 10 had only a very faint trace of pigment along its anterior border. These color arrangements are continued to the posterior end, except where modified by the presence of sex products. There is a noticeable brown band at the base of each parapodium, and the ventral surface is colored much like the dorsal except that the tint is fainter and there is more iridescence. The nuchal cirri are long, reaching the middle of the prostomium (plate 1, figure 1); these are foreshortened in figure 2. The dorsal cirri (text-figures 3, 4, 5, 6) are relatively long, all colorless, but banded with brown or purple. These bands occur at constricted parts of the cirrus, but there is no true articulation. The anal cirri (plate 1, figure 4) are two pairs, both ventral to the anus, the dorsalmost the larger and colored, the ventral ones being uncolored.

A sexually mature female showed the entire sex region of a sage-green color, due to the contained eggs, the only trace of the original coloration being a narrow brown band along the anterior border of each somite, and a faint shading over the dorsal surface. In alcoholic material a good deal of the brown coloration about the head and the brown band on the anterior margin of each somite persists.

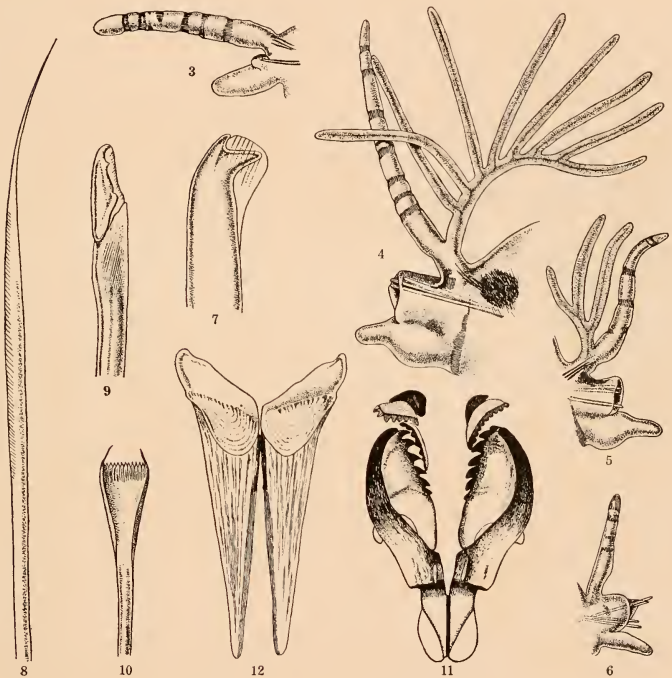
The gills appear on the fifth somite as a one-branched structure which becomes two-branched on the sixth, six-branched on the seventh, eight-branched on the tenth, nine-branched on the fifteenth, and fifteen or more branched in later somites. The number of branches begins to decrease from the thirty-fifth to the fortieth, becoming three-branched by the forty-fifth, and gills disappear entirely at about the fifty-eighth. At their greatest development the gills are very prominent, meeting over the dorsal surface of the body.

The first parapodium (text-figure 3) has a very long dorsal cirrus, banded with brown, but not definitely articulated. The ventral cirrus is not more than one-quarter as long as the dorsal and is short and thick. The setal lobe is very small, its posterior lip being a trifle longer than the anterior. In the figure drawn (a posterior view) the anterior lip is obscured by the posterior. There are aciculæ in the setal lobe and needle aciculæ extending into the base of the dorsal cirrus.

The tenth parapodium (text-figure 4) has a much larger setal lobe than the first, but the arrangement of anterior and posterior lips and aciculæ is much the same. Its dorsal cirrus is long and slender, extending beyond the tips of the slender gill-filaments, which in this somite are eight in number. Inside the body-wall is a dense black patch of pigment just internal to the base of the dorsal cirrus. The ventral cirrus has a much swollen base, from the end of which the cirrus proper arises. This pigment patch and the peculiar form of the ventral cirrus are characteristic of most of the parapodia of the anterior region of the body.

The fifty-first parapodium (text-figure 5) resembles the tenth in general outline, but all parts are smaller and ventral aciculæ have made their appearance. In a later parapodium (text-figure 6, the tenth from the pygidium) the post-setal lip is pointed at the apex and the ventral cirrus has lost its swollen base.

The anterior parapodia have each two or three aciculæ with bluntly rounded apices. By the fiftieth parapodium two others appear, lying ventral to the former variety, each with terminal and subterminal teeth (text-figure 7) and with a hood covering its apex. Both forms of aciculæ occur in all parapodia posterior to these.



TEXT-FIGURES 3 to 12. *Leodice longicirrata* Webster.

3. First parapodium ×22.
4. Tenth parapodium ×22.
5. Fifty-first parapodium ×22.
6. Tenth parapodium in front of pygidium ×22.
7. Posterior acicula ×400.
8. Simple seta ×400.
9. Compound seta ×230.
10. Pectinate seta ×400.
11. Maxilla ×22.
12. Mandible ×22.

The setæ are of three kinds, simple, compound, and pectinate, probably present in all somites, though I was unable to find any pectinate ones in the first parapodium. Of the simple setæ (text-figure 8) the dorsalmost ones in each parapodium are longer than the others, but otherwise they are of exactly the same form, the difference of length being due to length of shaft. They are slightly broadened toward the ends, one margin of this being striated, and taper to an acute tip. The compound (text-figure 9) have rather a heavy basal portion, with its apex beveled and striated, its terminal portion with a large apical and small subapical tooth, covered by a hood with serrated edge. The pectinate setæ (text-figure 10) have a long tooth at either end of the row, with about 14 small, sharp-pointed, intermediate teeth.

The jaw apparatus is comparatively light in color, becoming darker with increase in the size of the animal. In the maxilla the carrier is short (text-figure 11), the outer portion of either half is rounded and wing-like, thinner than the inner portion. There is a dark-brown band along the junction of the two halves. The forceps are long and slender, dark brown at the apices, with little color elsewhere except at the base. The right proximal plate has 7 teeth, the left 6, both plates dark brown along the edges but lighter elsewhere. The right distal plate has 10 teeth, the left not more than 8, the unpaired has 6. All of these plates have the toothed margins colored, but with scarcely any color elsewhere. There is a dark-brown patch anterior to each distal paired plate. The mandible (text-figure 12) is much lighter in color than the maxilla, each half with a dark-brown patch along its inner anterior margin and with a faint coloration along its beveled portion.

Webster described his species *longicirrata* as having long, delicate, smooth tentacles, this being the main difference between this and *articulata*. I have examined Webster's type in the U. S. National Museum and find that while the articulation is not very clear in this preserved specimen, it certainly is present. The removal of this distinction makes it clear that the species are identical. Ehlers gives only a brief description of the species *articulata* and figures the dorsal cirri as sharply articulated. As I have stated above, they appear articulated, but a more careful study shows this to be an irregular wrinkling and not a true articulation. Verrill records neither *articulata* nor *longicirrata* from Bermuda, but describes two species, *elegans* and *margaritacea*, the first from only a single individual. From a comparison of his descriptions with specimens of *longicirrata* collected by myself in Bermuda, in the locality where he records *margaritacea* as abundant, I am convinced that both species are identical with *longicirrata*.

At the Dry Tortugas, Tobago, and Bermuda I found *L. longicirrata* living in tubes covered with small stones and bits of shell on the under side of stones in tide pools, but never abundant. Ehlers's specimens were taken "off French Reef in 15 fathoms." Augener's material was collected in latitude 41° 34′ 30″ N. and longitude 65° 54′ 30″ W., and in latitude 33° 42′ 15″ N. and longitude 76° 00′ 50″ W., the first in 306 fathoms, the second in 464 fathoms. It was described by Treadwell from Porto Rico, and the collection of the American Museum of Natural History contains specimens from the Bahamas. The U. S. National Museum has specimens from Pernambuco, Brazil; from St. Thomas in the Virgin Islands; from Cuba; from Key West; from latitude 27° 04′ N. and longitude 83° 21′ 15″ W. in 26 fathoms; from latitude 28° 45′ N. and longitude 85° 02′ W. in 30 fathoms; from latitude 29° 11′ 30″ N. and longitude 85° 29′ W. in 26 fathoms; and from latitude 28° 9′ N. and longitude 82° 50′ W. in 12½ fathoms. It seems to me probable that the specimens described by McIntosh as a variety of *Eunice* (*Leodice*) *vittata* were of this species, since the agreement in tentacle structure and gill arrangement is very close between the two.

Leodice rubra Grube.

(Plate 2, figures 1 to 4; text-figures 13 to 20.)

Eunice rubra Grube, 1856, p. 59.
Eunice rubra Ehlers, 1887, p. 87, plate 26, figures 1–11.
Eunice rubra Treadwell, 1901, p. 197.
Eunice ornata Andrews, 1891*a*, p. 284, plate 13, figures 6–13.
Eunice ornata Treadwell, 1901, p. 195.

A small form, found in crevices in the coral rocks. A mature female with about 130 somites was 105 mm. long with a head width of 3 mm.

General body-color in life is dark olive-green, shading into purplish brown toward the posterior end, though in sexually mature forms the color posteriorly is largely dependent on the color of the sex products. All color is lost in the preservation.

The prostomium (plate 2, figures 1 and 2) is noticeably bilobed and is mostly colorless, though with some brown and green pigment in front of the tentacles. The tentacles are foreshortened in figure 2; in life the median reaches to the anterior border of the fourth somite, the inner paired are nearly as long, and the outer paired are much shorter. Each has a small basal joint followed by a longer one, and this is followed by shorter articulations, becoming moniliform toward the end. The basal half of the inner paired and the median tentacles is a light olive-green; their terminal half is colorless. The outer paired tentacles are also without color. The eyes are small and dark blue in color. A narrow, collar-like prolongation of the peristomium extends over the base of the prostomium. This is mainly without color, but has some pigment along its anterior border, mainly in three patches, one behind each of the inner paired tentacles and one behind the median. On either side, between the pigmented spots, are prominent flecks of white.

The color of the dorsal surface of the prostomium (plate 2, figure 2) is olive-green and brown flecked with white, the latter being most prominent along the anterior border. Ventrally the same colors appear, but are not so marked as dorsally. On its lower surface the peristomium is prolonged into a prominent lip, which is bounded on either side by a distinct groove extending back for more than one-quarter of the length of the peristomium. The second somite is very short, with essentially the same ground-color as the other somites and has dorsally a transverse row of white spots. The nuchal cirri extend to about the middle of the peristomium and are colorless but flecked with white pigment.

The third somite is about twice as long as the second, and later somites are essentially similar to the third, though the body gradually narrows toward the posterior end. For the first third of the body there is dorsally a transverse green band in each somite; through the median region this surface is a diffuse olive-green (plate 2, figure 3), while the extreme posterior end is a deep maroon (plate 2, figure 4). In a sexually mature female the somites containing eggs have a drab color.

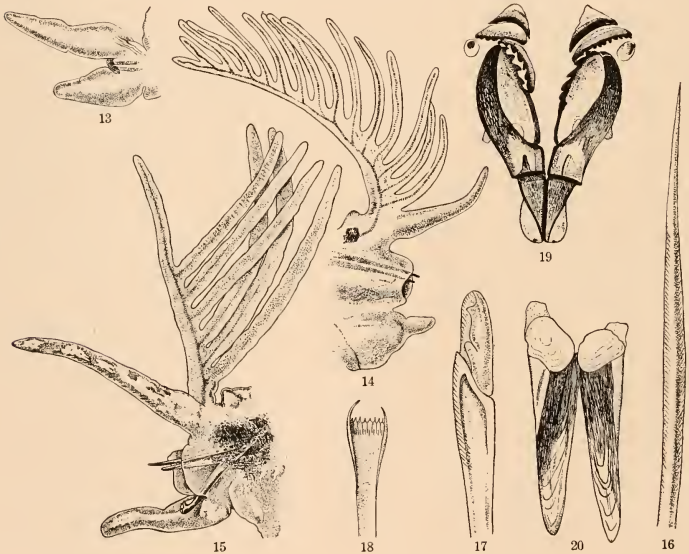
Beginning with the sixth, each somite has a conspicuous white spot in the median dorsal line (plate 2, figures 1, 3). Behind the eighteenth somite other spots appear on either side of the median line, singly at first, but later becoming more or less diffuse patches.

There are two pairs of anal cirri, the dorsal ones being much the larger and noticeably articulated (plate 2, figure 4). The first parapodium has a small setal lobe and large cirri (text-figure 13). Two black aciculæ extend into the setal lobe. The succeeding somites show a relative increase in the importance of the setal portion (text-figure 14). The dorsal cirri are relatively much more slender, while the ventral cirrus is a small lobe at the end of a much-swollen ventral pad. This pad-like structure persists for only about 20 somites and then disappears, parapodia from the middle of the body showing no trace of it (text-figure 15). The tenth parapodium (text-figure 14) shows the anterior

and posterior lips of the setal lobe about equal in size, with two aciculæ reaching the surface between them. The gill arises from a broad base common to that of the dorsal cirrus. Just at the base of the gill is a small brown spot visible only under considerable magnification.

A parapodium from the middle of the body (text-figure 15, drawn from a living specimen) shows a relatively considerable increase over the tenth in the size of the dorsal and ventral cirri, and the difference in size between the anterior and posterior lips is more marked. In addition to the dorsal aciculæ there is a ventrally placed hooked one. All parapodia have a tuft of needle setæ extending into the dorsal cirrus, though these escaped the attention of the artist in making these drawings. In the middle of the body there is a rather large brown pigment patch on the anterior face of the parapodium at the base of the dorsal cirrus.

The gills in the specimens in my collections appear first on the eighth or ninth somite and in one from Beaufort, North Carolina, they begin on the seventh. The first pair is small, with not more than 2 branches; the second has 8, the third 13. From the tenth to the twentieth they are very prominent, sometimes with as many as 17



TEXT-FIGURES 13 to 20. *Leodice rubra* Grube.

13. First parapodium ×30.
14. Tenth parapodium ×27.
15. Middle parapodium ×20.
16. Simple seta ×350.
17. Compound seta ×350.
18. Pectinate seta ×350.
19. Maxilla ×18.
20. Mandible ×18.

branches, meeting from opposite sides in the mid-dorsal line (text-figure 14). Behind the twentieth pair a good many somites have 8 branched gills, the number decreasing to 1 or 2 near the pygidium, and the last 4 somites are without gills. It seems probable that the number of branches increases with the age of the animal, since very small individuals may have as few as 3 in the middle of the body. In life the gills are bright red because of the contained blood, but this is lost in the preservation.

The setæ are of three kinds, uniform throughout the body. The simple setæ (text-figure 16) have their sides nearly parallel except at the end, where they abruptly converge to an acute point. Along either side are numerous striations. The compound setæ (text-figure 17) have shafts of varying lengths, some reaching as far as the middle of the dorsal cirrus. The end of the shaft is enlarged and marked by numerous denticulations along one edge; the terminal joint is relatively small, with a sharp apical and subapical tooth covered by a hood. The pectinate setæ (text-figure 18) are small, with about 12 teeth, the terminal ones being longer than the others.

The maxilla is brown, the color being much denser along the margins of all plates and along the tips of the forceps (text-figure 19). The carrier is short, its wings being relatively rather large. The forceps have the usual form, their basal portions light brown in color, the distal two-thirds being a very dark brown. The proximal plates have 5 teeth on the right and 4 on the left; the distal paired have 8 on the right and 5 on the left; the unpaired has 6. A narrow, dark, crescentic pigment patch lies distal to the distal paired plate on either side and is continued into a conical expansion of a much lighter color. The mandible (text-figure 20) has heavy brown shafts marked with concentric lines, while the beveled surfaces are covered with a heavy white deposit, in which are a few dark lines.

Apparently in the region of the Dry Tortugas the species becomes sexually mature about the middle of June.

Grube's original description was of a specimen from St. Thomas, noted as collected under Floridæ, but no figures were published. Ehlers later redescribed and figured the species. The most important differences between his description and the specimens I have seen relate to the form of the setæ and the jaw. According to his figures the simple setæ are more lanceolate than I have described them, and the pectinate setæ do not show longer terminal teeth. The number of teeth in the maxillary plates are also not the same in the two cases. These differences seem not more than individual variations or, in the case of the pectinate setæ, the personal equation of the artist. I have examined Andrews's type of *Leodice* (*Eunice*) *ornata* in the U. S. National Museum and find it the same as *rubra*.

Leodice rubra seems to be common throughout the West Indian region, for I have collected it in the Dry Tortugas, in Porto Rico, in Tobago, and in Bermuda. It has not been described before from the latter locality, and I found only one specimen, in Tuckerstown Bay, in 1916. The U. S. National Museum has specimens from Beaufort and Fort Macon, North Carolina; from Cuba, St. Thomas, Key West, and a large number of stations of the *Albatross* expeditions in this region, also one specimen from Pernambuco, Brazil.

Leodice unifrons Verrill.

(Plate I, figures 5 to 9; text-figures 21 to 30.)

Leodice unifrons Verrill, 1900, p. 644.

A small species resembling in general appearance a small *L. stigmatura* but usually more slender. It was described by Verrill from a single incomplete specimen collected at Flatts Inlet, Bermuda. An individual of 102 somites was approximately 50 mm. long. Verrill described the color as "pale brown with a median dorsal row of white spots one

to a segment and with olive-brown irregular markings on each side. Antennæ pale, banded with flake white." Those of my collections (plate 1, figures 5 and 6) had brownish-green markings in front of the eyes on the prostomium, with similar pigmentation on either side of the median line throughout the anterior region of the body. These lateral patches are joined by intersegmental narrow bands of the same color, most easily seen when the animal is expanded. Anteriorly there are prominent median dorsal white areas of considerable size which are continued posteriorly by a median row of white spots. The color of the posterior region of the body is dependent on the character of the intestinal wall or its contents, on the blood, and on the sex products. Sometimes (as in figure 7, plate 1) it may be brown from the intestine, or (as in figure 5) greenish blue from the sex products. A small speck of greenish-brown pigment occurs on the ventral face of the prostomium, but otherwise the ventral surface is uncolored except that posteriorly it has a double row of large black spots. On the dorsal face of each parapodium throughout the posterior half of the body is a small black spot (plate 1, figure 5). The tentacles showed the flake-white spots described by Verrill.

Preserved material is a dingy gray color with a marked iridescence.

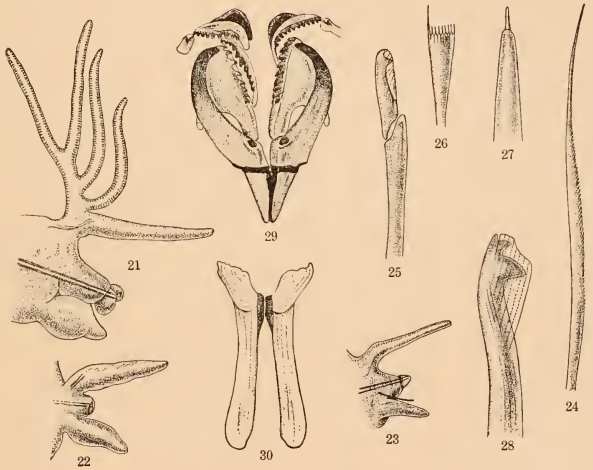
The form of the prostomium varies with the degree of expansion. The specific name *unifrons* indicates that there is no central fissure dividing the prostomium, and at times the anterior margin does seem to be entire; at other times a very faint depression appears, this being the more usual condition. When expanded the prostomium is broader than long (plate 1, figure 6) with prominent eyes. The median tentacle extends to about the fourth somite, the paired ones decreasing in size from the inner to the outer. They are all articulated, though this shows best in preserved material, the articulations in life being obscured by the pigmentation. The peristomium at its anterior edge is about as wide as the prostomium, but widens toward its posterior end. It is about twice as long as the second somite. Later somites increase slightly in width to about the middle of the body, while posterior to this is a gradual decrease in width. The nuchal cirri are about as long as the prostomium and very slender. Verrill stated that they are articulated, but I was unable to verify this point. The dorsal cirri are rather stout, larger than gill-filaments in gill-bearing somites. There are two pairs of anal cirri (plate 1, figure 8), one pair much longer than the other and very slender.

The gill arrangement is usually as described by Verrill. One individual had the gills beginning as a single filament on the third setigerous somite; there were two filaments on the fifth, three on the ninth, and four on the twelfth. Later somites showed variable numbers, the largest number being six on somites 21, 22, 26, and 27. Somites 28 to 34 had five filaments, 35 to 38 four, 39 and 40 three, 41 to 43 two, and 44 one. They disappeared entirely at the fiftieth setigerous somite. The gills are rather prominent in the anterior region, meeting across the mid-dorsal line of the body. The main stem is rather small (text-figure 21) and the filaments about equal in length.

The first parapodium (text-figure 22) has a rounded post-setal lobe and two aciculæ. The cirri are both prominent, the dorsal more so than the ventral. The dorsal has a brown pigment patch on its dorsal surface and a tuft of needle setæ. The tenth parapodium (text-figure 21) has a setal lobe with its median portion drawn out into a dorso-posterior and an antero-ventral lobe. The dorsal cirrus is very long and slender, while the ventral one is small and conical, carried on a globular swelling. The dorsal cirrus is carried rather high on the parapodium and has needle aciculæ at its base. There are two large aciculæ in the setal lobe. Posterior parapodia (text-figure 23) have a pointed post-setal lip, while the cirri have about the same relative size that they have in anterior somites, the ventral one, however, having lost its globular base and become slender. There is a small needle acicula in the dorsal cirrus and a large ventral acicula in the setal portion.

The simple setæ (text-figure 24) are slender, very slightly widened and curved toward the ends, the convex margin of the curve finely toothed; the compound setæ (text-figure 25) have the ends of their basal joints hardly wider than the terminal joints and smooth, the terminal joints with apical and subapical teeth and a hood with fine marginal denticulations; the pectinate setæ (text-figure 26) have comparatively few teeth, the terminal one at one end much longer than the others. The aciculæ of the anterior somites (text-figure 27) sometimes show an acute point, which is not always present, though its absence may be due to accident. The posterior ventral aciculæ (text-figure 28) have three terminal teeth, of which the proximal one is much the largest, the whole covered by a striated hood.

The maxilla is light-colored except along the margins (text-figure 29); the carrier is short and conical in form, almost colorless, except for a dark band along the junction of the two halves and at the junction between carrier and forceps. The forceps is slender, colorless for most of its extent, but with the tips dark brown, this color lightening as it shades back into the shaft. Near the base of each half there is a depression colored very dark brown and surrounded by uncolored ridges. The plates are also almost colorless except for the margins, the proximal paired plates with 10 teeth on the right and 8 on the left, the distal paired with 12 on the right and 9 on the left, the unpaired with 10. Small accessory plates lie lateral to the others and there are crescentic pigment patches



TEXT-FIGURES 21 to 30. *Leodice unifrons* Verrill.

21. Tenth parapodium ×34.
22. First parapodium ×34.
23. Posterior parapodium ×34.
24. Simple seta ×385.
25. Compound seta ×380.
26. Pectinate seta ×380.
27. Acicula ×380.
28. Acicula ×380.
29. Maxilla ×34.
30. Mandible ×34.

distal to them. The mandible (text-figure 30) has the halves widely separated except at the anterior end, the only color being a dark-brown patch in each half at the point of contact of the two. The beveled surface is marked with concentric lines of a little darker shade than the rest.

This species lives in narrow tubes formed of stones fastened together by a little organic matter and attached to the under side of stones, shells, etc., in shallow water. In this they resemble *L. stigmatura*, but the tube is much more delicate than in that species. It is difficult to remove the animals, for they cling very closely to crevices in the stones and even when put intact in water are apt to break as a result of their own squirming movements. At the Dry Tortugas a few were collected at the landing at Fort Jefferson; in Bermuda I found one near Agar's Island and one in Tucker's Bay. They are common in Montego Bay, Jamaica.

The type is in the Yale University Museum and was loaned to me by Professor Verrill, but had been dried and is now of little use for study.

Leodice stigmatura Verrill.

(Plate 1, figures 10 to 13; text-figures 31 to 40.)

Leodice stigmatura Verrill, 1900, p. 641.
Leodice tenuicirrata Verrill, 1900, p. 643.

A small species, averaging not more than 75 mm. in length. The one figured had 225 somites. They occur in tubes composed of stones and shells loosely fastened together by an organic material, the tubes being much longer than the animals, often extending for considerable distances over the lower surfaces of large stones just below low-water mark. The animals are able to turn freely in the tubes.

In life (plate 1, figure 10) the anterior end of the animal has a light pearly luster, more or less tinted by the blood in the blood-vessels. The color of the middle and posterior regions varies considerably with the condition of the animal. Immature specimens appear grayish brown, due to the color of the intestinal wall, while sexually mature individuals show a pinkish tint in the female, due to the contained eggs. The posterior end is colorless. Beginning at the end of the first quarter and extending nearly to the pygidium, each somite has at the base of the parapodium on either side a prominent black spot, while throughout the greater part of the posterior region each somite shows two larger black spots in the middle of the ventral surface. Anteriorly the bright-red gills give a pinkish tinge to the body.

The prostomium (plate 1, figure 11) is bilobed, though the lobing is not extreme, and the eyes are prominent. The median tentacle is long and slender, more than six times as long as the prostomium and feebly articulated at the end. The inner paired are shorter than the median and not so evidently articulated, while the outer paired are not much more than half as long as the inner and are very markedly articulated. In none of my specimens was the articulation as evident as Verrill has described it, though it is much more noticeable in alcoholic than in living material.

The peristomium is broader than long (plate 1, figure 11), about twice as long as the second somite. The second somite is colored like the first, its nuchal cirri extending as far as the eyes, and very feebly, if at all, articulated.

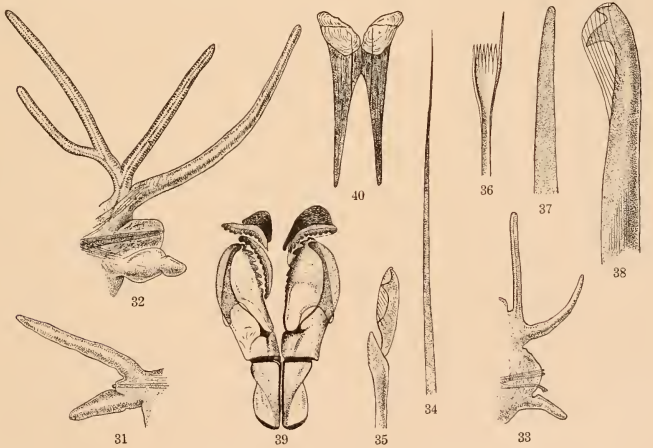
The gills begin as a single filament on the third setigerous somite. In one specimen from the Dry Tortugas this became trifid on the seventh, four-branched on the tenth, and five-branched on the fifteenth. As far as the sixtieth (plate 1, figure 12, taken from this general region) the number of branches vary from 3 to 6, the most frequent number being 4 or 5. Behind the sixtieth somite the number decreases, being one-branched on all behind the ninetieth somite. The number of posterior abranchiate somites seems to vary in different individuals. Verrill states that about 40 are in this condition, but

I have found some with only 6. As Verrill stated, the filaments arise from a short stem, so that the gills are digitate rather than pectinate. There are two pairs of very unequal anal cirri (plate 1, figure 13).

The first parapodium (text-figure 31) has very prominent cirri, the dorsal much longer and more slender than the ventral. The setal portion has a straight posterior lip and a rounded anterior one, the latter divided by a notch into a dorsal and a ventral lobe; this is not shown in the figure, which is a posterior view. There are two aciculæ in the setal lobe, and a tuft of needle aciculæ extends into the dorsal cirrus.

Later parapodia show very long dorsal cirri, a character which it seems to me led Verrill to describe a single incomplete specimen as a new species, *L. tenuicirrata*. The tenth parapodium (text-figure 32) shows this long cirrus extending beyond the gills. The ventral cirrus is short and blunt, borne on a heavy base. The setal lobe is rounded and contains a pair of heavy aciculæ, and the needle aciculæ are present in the dorsal cirrus. Later parapodia (text-figure 33, from the middle of the body) show essentially the same form, as far as the setal lobe is concerned, but the cirri are very much reduced in size and a ventral hooked acicula has made its appearance.

The simple setæ (text-figure 34) are very long and slender, with no indication of a wing; the compound setæ (text-figure 35) have the basal portions enlarged at the apex and very finely toothed along their convex surfaces. The terminal joint of each is small with a terminal and a subterminal tooth of about equal size, and is covered by a striated wing. The pectinate setæ (text-figure 36) have very slender shafts and 7 or 8 prominent teeth, the terminal tooth at one end being much longer than at the other.



TEXT-FIGURES 31 to 40. *Leodice stigmatura* Verrill.

31. First parapodium ×34.
32. Tenth parapodium ×34.
33. Middle parapodium ×34.
34. Simple seta ×420.
35. Compound seta ×420.
36. Pectinate seta ×420.
37. Simple acicula ×320.
38. Hooked acicula ×320.
39. Maxilla ×52.
40. Mandible ×52.

The aciculæ of the anterior somites are straight with bluntly pointed apex (text-figure 37). In the posterior somites the dorsal acicula is of this character, while the ventral one has a very small terminal tooth which is usually a little larger than in the one figured (text-figure 38), a larger conical tooth just behind it, and a much larger curved subterminal tooth farther back. The whole is covered by a striated hood.

The maxilla is grayish brown in color with darker margins (text-figure 39). The carrier is a little longer than wide, with a dense pigment line at the base of each wing, on the inner margin of either half of the carrier and at the junction between these and the forceps. The forceps is slender, light brown in color except for a dark spot on the inner margin of each half. The right paired proximal plate has 10 teeth, the basal ones being very small, and the left has 6. The right distal has 10 and the left has 8, while the unpaired has 12. Distal to the paired plates on either side is a crescentic patch of pigment.

The mandible (text-figure 40) is very slender, the two halves rather widely separated posteriorly, and the beveled portion marked by faint concentric brown lines.

In Bermuda, in 1916, I found *Leodice stigmatura* abundant wherever there were flat rocks in quiet water, as in Fairyland Creek, Flatts Inlet, Tucker's Bay, and Tuckerstown Bay. They were less numerous in the Dry Tortugas, though they could usually be found on the under side of stones and empty conch-shells at the landing at Fort Jefferson. They were also collected at Marquesas Key and at Sand Key Light near Key West. Apparently they become sexually mature in these localities in late June and early July.

Leodice denticulata Webster.

(Plate 3, figures 1 to 4; text-figures 41 to 53.)

Eunice denticulata Webster, 1884, p. 316, plate 10, figures 41, 41*a*, 41*b*–45.
Eunice conglomerans Ehlers, 1887, p. 93, plate 23, figures 1–9; plate 24, figures 1–4.
Eunice cirrobranchiata? McIntosh, 1885, p. 277, plate XXXVIII, figures 9, 10, 11; plate XIX A, figures 21–24.
Eunice denticulata Treadwell, 1901, p. 196.
Leodice denticulata Verrill, 1900, p. 639.

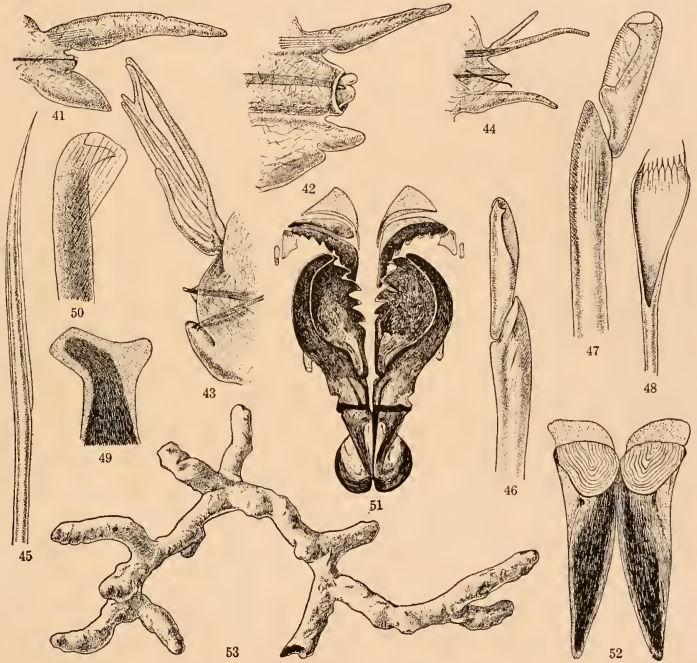
A large species, reaching a length of 500 to 600 mm., with a head width of 5 mm. The specimen figured (plate 3, figure 1) had 479 somites. In life the head and anterior somites are a bright vermilion-carmine, though the tentacles and the anterior margin of the peristomium have a lighter color. This color gradually weakens and disappears altogether by the fiftieth somite. Behind this point, except for a reddish color in the dorsal and ventral cirri and the bright-red gills, the body is practically colorless, though in some somites a very fine dusting of brown spots appears on the dorsal surface. Sexually mature individuals have a creamy tint throughout the sex region, this tint being lighter in males than in females. The posterior end of the body is a translucent white, against which the bright-red gills appear as very prominent organs. All color disappears in alcoholic material.

The prostomium (plate 3, figure 2) is two-lobed, with more or less reddish pigment arranged in fine lines on the dorsal surface, its anterior end uncolored. The tentacles are relatively short, extending for not more than one-third of their length beyond the prostomium; the unpaired tentacle is the longest, but the others (because of their longer cirrophores) extend about as far beyond the prostomium as it does. All of the tentacles are smooth, with bluntly rounded apices, more or less tinted with pink, but colorless at the ends.

The peristomium is as long as the following five somites (plate 3, figure 1). Dorsally it is smoothly rounded, but ventrally a rather prominent lip extends anteriorly below each lobe of the prostomium. The second somite (plate 3, figure 2) is very short, and its nuchal cirri extend to little more than the middle of the peristomium.

The gills appear as a single filament on the twenty-seventh somite; on the fiftieth this had increased to two, and in the region of the ninetieth there are three with an occasional small extra branch. The gills continue to the extreme posterior end of the body, though the number of filaments is reduced to one. At the very posterior end (plate 3, figure 4) the filament is much smaller than the dorsal cirrus. Through the middle of the body, where the number of filaments is greatest, they are very long and slender and form a dense fringe along the sides of the body.

The first parapodium (text-figure 41) has a very small setal lobe, with nearly equal lips and very prominent cirri, the dorsal one much longer and relatively more slender



TEXT-FIGURES 41 to 53. *Leodice denticulata* Webster.

41. First parapodium ×22.
42. Tenth parapodium ×22.
43. Ninety-seventh parapodium ×22.
44. Twenty-fifth parapodium in front of pygidium ×22.
45. Seta from first parapodium ×370.
46. Second form of seta from first parapodium ×760.
47. Seta from ninety-seventh parapodium ×460.
48. Pectinate seta from tenth parapodium ×850.
49. Dorsal acicula from ninety-seventh parapodium ×370.
50. Ventral acicula from last parapodium ×370.
51. Maxilla ×10.
52. Mandible ×11.
53. Portion of tube ×1.

than the ventral. The setæ are in a dense tuft and there is a dark-brown acicula which may not protrude to the surface at its outer end. A small tuft of needle aciculæ extends into the base of the dorsal cirrus. The tenth parapodium (text-figure 42) is thick, so that a cross-section of its seta lobe would be nearly circular. The posterior lip of the parapodium is slightly longer than the anterior and the two are continuous with one another in such a way as to leave a shallow groove between the lips and the rounded end of the lobe. On the dorsal surface of the lobe is a palp-like lip which overhangs the bases of the setæ and the single large acicula protrudes from the surface just ventral to this lobe. The dorsal cirrus is elongate-lanceolate in form with a constricted base and tuft of needle aciculæ. The ventral cirrus is roughly triangular with a rounded apex at the end of a very thick ventral pad. This pad-like structure appears first on the fifth somite and extends throughout the greater part of the body.

The ninety-seventh parapodium (text-figure 43) shows very little distinction between the anterior and posterior lips, and has ventral aciculæ in addition to the dorsal ones comparable to those found farther forward. The dorsal cirrus is long and slender, smaller than the gill filaments which arise from it. The ventral cirrus is short and thick at the end of the ventral pad. Later parapodia are conical in outline (text-figure 44), with prominent, slender, dorsal and ventral cirri, the former with a small gill-filament. The needle aciculæ and the two sets of large aciculæ mentioned earlier also appear.

There are two pairs of anal cirri (plate 3, figure 4), the ventral ones much smaller than the dorsal.

The setæ of the first parapodium are of the usual three forms. The simple setæ (text-figure 45) are slender, very gently curved, with a well-marked wing along the concave and a smaller one along the convex margin. The compound setæ (text-figure 46) have stout basal portions with their apices broadened and obliquely striated; the terminal portion of each is slender, with apical and subapical but no basal tooth, and is covered by a striated hood. The setæ of later somites, through elongation of their basal portions, are carried much farther from the body than in the first, and toward the posterior end of the body extend as far as the apex of the dorsal cirrus. The simple setæ are more curved and the wing along the convex edge is more sharply expressed than in the first somite. The compound setæ (text-figure 47) have a relatively shorter but absolutely longer terminal portion, whose whole contour is more sharply expressed than in the first somite. The subapical tooth is larger and a basal knob is present. The pectinate setæ (text-figure 48) are similar throughout, with about ten well-marked teeth, the terminal ones equal and longer than the others.

The dorsal aciculæ (text-figure 49) are rather heavy, dark brown in color, but lighter at the apex, which is bifid, the dark-brown central portion extending into only one of the branches. The ventral aciculæ (text-figure 50) are much more slender with bidentate apex covered by a striated hood.

The maxilla is dark brown, washed by a whitish incrustation. The carrier is short, with relatively large wings on the sides. The forceps is large, with slender halves very dark brown in color. The right proximal plate has 4 teeth, the left has 5; the right paired plate has 6, the left has 2. The unpaired plate has 6 teeth (text-figure 51). All of the plates are dark in color with the apices of the teeth marked with white. Beyond the distal plates are light-brown chitinous patches. The mandible is short and thick, the basal halves well separated and dark in color. The beveled portion is covered with a whitish incrustation and is marked with concentric brown lines (text-figure 52). Anterior to this beveled portion is a thin, whitish expansion on either side.

This species was collected in the Dry Tortugas in considerable numbers, living in parchment-like tubes which followed the windings of the cavities of sponges. These tubes are much branched (text figure 53) and have at intervals blindly ending passages.

On account of the toughness of the sponge tissue and the intricate windings of the tubes it is difficult to get entire specimens. The species was also common in collections made in Bermuda in 1916, though here I found it most often in the characteristic tubes on the under sides of stones. All of those collected in Bermuda were smaller than most of those from the Dry Tortugas, indicating possibly a varietal difference, but I was unable to discover any other essential differences between the two.

Ehlers's specimens were collected at Key West and at 24° 44′ N. and 83° 26′ W. The U. S. National Museum has specimens collected in Key West and Rodregas Creek, Florida; Curacao; Old Providence, West Indies; St. Thomas, Virgin Islands; off Cape San Antonio, Cuba; and in Dominica. The American Museum of Natural History has a specimen collected at Guayanilla Harbor, Porto Rico, and I have found it in the Dry Tortugas, in Bermuda, in Tobago, and at Guanica Harbor, Porto Rico.

Verrill considers this species identical with McIntosh's *Eunice cirrobranchiata* and I have so included it, though with some doubt. McIntosh's specimen was only a single fragment, which he records had evidently been dried. His description agrees fairly well with my specimens in the character of the head and setæ, but disagrees in the number of teeth in the maxillæ.

Leodice spongicola, new species.

(Text-figures 53*a* to 53*j*.*)

A rather small species measuring, after preservation, about 75 mm. in length with a diameter of 2 mm. In life it is much shorter and broader than this, the change following the action of the preserving fluids.

In the living animal the anterior region is light green in color with a marked iridescence. This green fades out gradually in successive somites behind the anterior region, becoming at first a yellowish brown, but eventually disappearing entirely, so that the only color in the posterior end is due to the contained blood. In alcohol the green turns to a dingy gray.

The prostomium (text-figure 53*a*) is deeply bilobed and has a considerable dorsoventral diameter. The peristomium seen from the dorsal surface is nearly rectangular in outline and has prominent anteroventral lips. The tentacles are about twice as long as the prostomium and taper gently to their ends. An unusually wide space separates the bases of the median and the inner paired tentacles. The inner paired have a small basal joint; that of the outer paired is larger and is situated close to the anterior margin of the inner. The eyes lie between the bases of the inner and outer paired tentacles.

Somite 2 is less than half as long as somite 1 and the slender nuchal cirri are only a little longer than the somite.

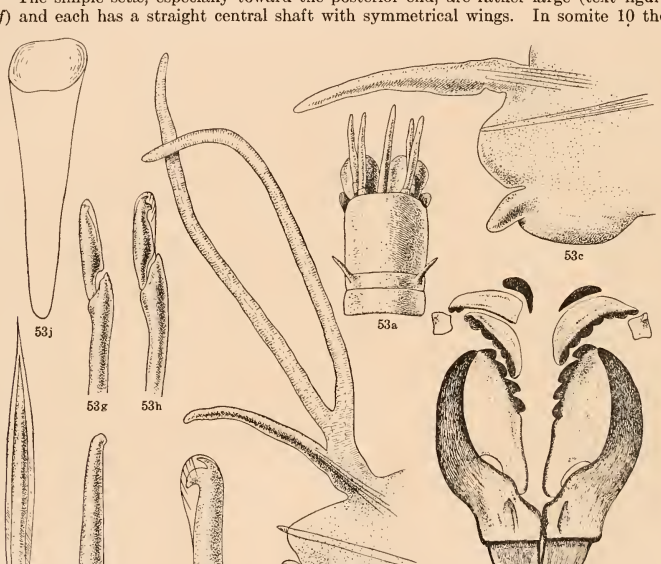
The gills appear at about somite 27, at first as very small structures, but they rapidly increase in size and throughout the greater part of the body they are longer than the diameter of the body in its preserved condition (text-figure 53*b*). At first each gill has 1 branch, but by somite 34 this becomes 2 branched, and a few somites farther back it has 3 branches. While there may be exceptions in individual somites, 3 is the usual number to the very last gill, which is on the fourth somite in front of the pygidium. There is one pair of large anal cirri.

The tenth parapodium (text-figure 53*c*) has a rounded post-setal lobe and a single large acicula. The dorsal cirrus is slender and relatively long and has a tuft of needle aciculæ. The ventral cirrus is oval in outline, rather small, and is carried on the end of a pad-like swelling. There is a considerable tuft of compound setæ, with a smaller number of simple and pectinate ones. A parapodium from the region of somite 70 is

*This species was collected in July 1921, after the printing part of this paper was well advanced. Hence the interpolation of these numbers.

shown in text-figure 53*b*. The setal lobe is small and conical and there are two aciculæ, the dorsal one the heavier and rounded at the apex (text-figure 53*d*), while the ventral one has a terminal and subterminal tooth, the latter the larger, both covered by a prominent hood (text-figure 53*e*). The base of the gill is heavy and carries the slender cirrus on its outer margin. Beyond the insertion of the cirrus the gill divides into two long, slender branches, more than three times as long as the cirrus. This form of parapodium is continued to the extreme posterior end of the body, though in posterior somites the ventral cirrus is much longer than it is in the middle region. In the region of somite 70, as figured in text-figure 53*b*, the ventral cirrus is small, on the end of a short pad. Needle aciculæ occur in the dorsal cirrus in all somites.

The simple setæ, especially toward the posterior end, are rather large (text-figure 53*f*) and each has a straight central shaft with symmetrical wings. In somite 10 the



TEXT-FIGURES 53*a* to 53*j*. *Leodice spongicola.*

53*a*. Anterior end ×12.
53*b*. Parapodium from region of seventieth somite ×60.
53*c*. Tenth parapodium ×60.
53*d*. Dorsal acicula from region of seventieth somite ×250.
53*e*. Ventral acicula from region of seventieth somite ×250.
53*f*. Simple seta ×350.
53*g*. Anterior compound seta ×350.
53*h*. Posterior compound seta ×350.
53*i*. Maxilla ×46.
53*j*. One-half of mandible ×46.

compound setæ are as shown in text-figure 53*g*. The basal joint has a slightly enlarged apex, denticulated along its convex margin. Instead of a prominently hooked terminal joint covered by a hood, as is the most common form, the terminal joint is an elongated oval, slightly pointed at the apex and with faint indications of teeth inside the hood. Except for these teeth the distinction between teeth and hood is not easily seen. In posterior somites the compound setæ have a slender basal joint, the terminal joint with a terminal and subterminal tooth, covered by a hood (text-figure 53*h*).

The maxillæ are dark in color, the tips of the forceps and the marginal teeth of other plates being the darkest portions. The carriers (text-figure 53*i*) are short and broad with relatively prominent wings, the forceps moderately heavy. Each of the proximal paired plates has 4 teeth, the right distal paired has 7, the left one has 2, and the unpaired has 6. Pigmented patches of chitin lie distal to the paired plates and a small colorless plate is present on either side. The mandible (text-figure 53*j*, showing only one-half) is quite devoid of pigment and the beveled portion is very small.

This species was collected in small sponges living on the sandy bottom off Sandy Point, in Montego Bay, Jamaica. One individual occupied a branched membranous tube quite similar to that of *L. denticulata* (see text-figure 53). I did not see these tubes in connection with other individuals, though even if originally present they might very easily have been lost in cutting the animals out of the sponges. In the arrangement of gills, form and proportion of anterior somites, and in mode of life, *L. spongicola* agrees closely with *L. denticulata*, but differs from that species in size, coloration, and in minor details of structure as noted above.

The type is in the American Museum of Natural History.

Leodice longisetis Webster.

(Plate 2, figures 5 to 8; text-figures 54 to 65.)

Eunice longisetis Webster, 1884, p. 317, plate 10, figures 46–49.
Eunice violacea-maculata Ehlers, 1887, p. 86, plate 24, figures 11 and 12; plate 25, figures 1–7.
Leodice longisetis Verrill, 1900, p. 639.
Eunice nigricans ? Schmarda, 1861, p. 131.

A large species, reaching a length of 400 mm., with as many as 170 somites. In life the general color of the body (plate 2, figure 5) is a dark green, showing marked iridescence and with longitudinal, irregularly arranged dark lines. Toward the middle of the body these dark markings cover a larger area and there are numerous yellow spots scattered over the surface. The posterior third of the body is dark brown, passing into purple, the relative amounts of these colors varying in different individuals. The sixth somite is nearly or quite colorless. The ventral surface is lighter than the dorsal, is more or less marked with black, and is brown toward the posterior end. The tentacles and cirri are all banded, the tints varying in different parts of the body. The tentacles and the anterior cirri are greenish brown with white bands, while farther back the greenish brown changes first to brown and later to purple (plate 2, figures 5, 6, 7). One apparently full-grown individual, collected in 1910, was uniformly deep purple with the gills a lighter red. In alcohol the longitudinal brown markings persist, as do the pigment areas on the cirri.

The prostomium (plate 2, figure 6) is obscurely four-lobed, the median lobes small. There is one pair of small black eyes. The median tentacle is as long as the first six somites; the inner paired tentacles are intermediate in length between the outer paired and the median, all three sets being similarly colored.

The peristomium (plate 2, figure 6) is a little longer than wide, and very slightly wider at the posterior than at the anterior border. The figure shows the second to the fifth somites as much contracted, but in life the peristomium is as long as from the

anterior border of the second somite to the middle of the fifth. The nuchal cirri extend to the anterior border of the peristomium. In the first two setigerous somites the ventral cirri are rather prominent, but in those immediately following they are small and attached to the end of a thick pad-like swelling. Posteriorly this pad disappears and the ventral cirrus again becomes prominent.

The gills occur first on the ninth somite and extend to the posterior end, only a very few of the posterior somites being free from them (plate 2, figure 8). The number of branches seems not to be constant in the first gills, but usually there are several. The tenth somite has 9 branches, and toward the middle of the body there are as many as 15. This number decreases at the posterior end, the last one or two having only one branch.

The first parapodium (text-figure 54) has relatively large cirri and a very small setal lobe, which shows no evident distinction between anterior and posterior lips. A single acicula extends into the setal lobe and two into the dorsal cirrus. The tenth parapodium (text-figure 55) has a very long and slender dorsal cirrus, which retains in alcoholic material a brown patch near the base and bands toward the apex. There is a prominent posterior lip to the setal lobe, its margins being continuous above and below with the anterior. There is a rounded elevation between the two lips and a large acicula protrudes just dorsal to this. A tuft of small aciculæ lies at the base of the dorsal cirrus. The ventral cirrus is short and conical, and is carried on the end of a rounded ventral pad. There is a collection of brownish pigment on the dorsal surface of this pad and on the base of the cirrus. The seventy-ninth parapodium (text-figure 56) is very similar to the tenth in general form, but is smaller and the gill is much more prominent. In addition to the aciculæ of the types described for the tenth, there is a ventral hooked acicula which appears at about the thirty-fifth parapodium. There is more or less pigment on the cirrus and on the dorsal surface of the setal lobe.

The one hundred and thirtieth parapodium (text-figure 57) is (in alcohol) a uniform purplish brown except for the white ends of the cirri. The posterior lip of the setal lobe is conical and extends much beyond the anterior. The whole parapodium is much smaller than those farther forward, as is demonstrated by comparing figures 54, 55, 56, and 57, all being drawn to the same scale.

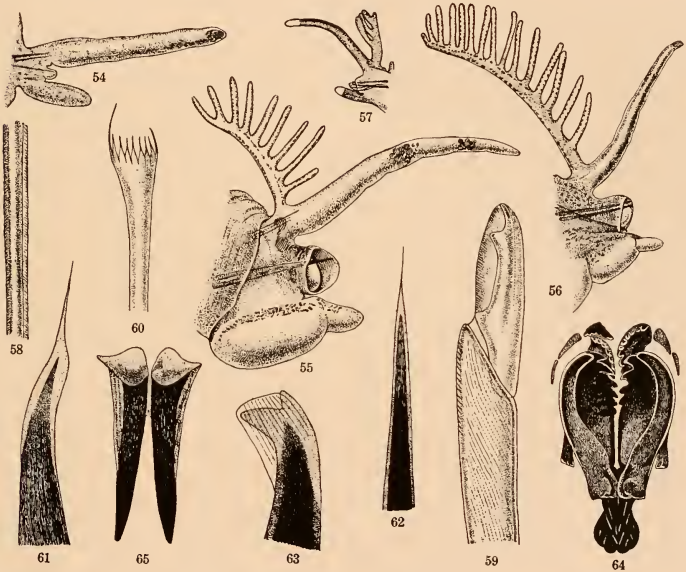
The setæ are similar in form throughout the body, the difference in length being due to greater or less elongation of the shaft. The simple setæ (text-figure 58, showing only a portion) are very long and gently curved with a definite wing along one edge of the curved portion, the opposite edge finely striated and resembling a narrower wing. The compound setæ (text-figure 59) are relatively large, the stalks very slightly widened at the end and beveled. Along the longer side are fine denticulations and there are striations on the surface. The terminal joint of each has an apical and a subapical tooth covered by a hood. The pectinate setæ (text-figure 60) are much more sharply outlined than is usual in this form of seta, with 9 teeth, the terminal ones equal in size and longer than the others.

In a posterior parapodium there are two sorts of dorsal aciculæ (text-figures 61 and 62). One form is more slender than the other and terminates in a very acute point, the axis being a dense black; the other is larger, lighter in color, and curved at the end. Apparently these are similar throughout the body, but I was unable to get many that were entire and can not be certain on this point. As far back as the thirty-fifth somite there is only one of these dorsal aciculæ, but behind this point there appear a second dorsal and a ventral one. The ventral aciculæ (text-figure 63) are stouter than the dorsal, and each carries a terminal and a subterminal tooth covered with a hood.

The jaw apparatus is very dark in color. The maxilla (text-figure 64) has very short and almost black carriers, the forceps relatively long and slender and not much

curved. The proximal paired plates have 4 large teeth on the right and 6 on the left. The distal paired ones have 9 on the right and 6 on the left, while the unpaired has 6. The mandible (text-figure 65) has shafts which are very dark, except for the outer anterior margins, and the beveled portion is coated with a deposit of a whitish material.

Webster describes this species from Bermuda. In another part of the same paper (p. 319) he records *Eunice violacea*. Verrill describes *Leodice longisetis* and *violacea-maculata* of Ehlers in his collections from Bermuda, and decides that it was the latter species rather than the Pacific species *violacea* which Webster saw. I have examined at the U. S. National Museum both Webster's type of *longisetis* and the one he described as *violacea* and am certain that they are identical. The type is very small, which perhaps explains Webster's decision that the two are of distinct species. Verrill considers that *longisetis* and *violacea-maculata* are distinct species, giving as one distinction the absence of a white nuchal band in the latter. A specimen from his collection labeled *violacea-maculata* has this nuchal band and seems to me to differ from *longisetis* merely in



TEXT-FIGURES 54 to 65. *Leodice longisetis* Webster.

54. First parapodium ×20.
55. Tenth parapodium ×20.
56. Seventy-ninth parapodium ×20.
57. One-hundred and thirtieth parapodium ×20.
58. Shaft of simple seta ×370.
59. Compound seta ×370.
60. Pectinate seta ×370.
61. Dorsal acicula ×370.
62. Second form of dorsal acicula ×370.
63. Ventral acicula ×370.
64. Maxilla ×10.
65. Mandible ×10.

being of larger size. From Webster's description of *longisetis* and Ehlers's of *violacea-maculata* I am convinced that the two are identical, the name *longisetis* having priority. There is no evidence that *violacea* Grube has been found in the West Indies.

Schmarda (1861, p. 131, with text-figures) described as *Eunice nigricans* a form from Jamaica. This was 110 mm. long, very dark brown or black in color, and with ringed tentacles. His description of the setæ, parapodia, and gills, and in a general way the jaws, agrees with *longisetis* and indicates that he had a specimen of the occasional color variety (see above) in which the entire body retains the purple coloration, which in most cases in the adult is restricted to the posterior end. One of these in my collection has a very minute cirrus-like "gill" on each of the fifth to the eighth somites, but differs in no other respect from the ones figured. Schmarda described the fourth somite as white, but he evidently counted the first setigerous somite as the first. In his plate 32, figure 260, he figures *Eunice schemacephala*, and a comparison of this with his description shows that this was his method of counting. Applying this rule to *nigricans*, its color arrangement agrees with *longisetis*. In *nigricans* the gills begin on the eighth somite instead of the ninth, as in *longisetis*. If this supposition is correct, the name *nigricans* has precedence.

Verrill mentions *Leodice longisetis* as one of the most abundant species in dead corals in Bermuda. I found it there only once, in 1916, on the under side of a stone in Tucker's Bay. It was never abundant in my Tortugas collections, though a few appeared each season. The U. S. National Museum has specimens from Curacao, Cuba, and from a number of stations in the vicinity of Key West. Ehlers's material was collected at the Tortugas.

Leodice mutilata Webster.

(Plate 3, figures 5 to 8; text-figures 66 to 76.)

Eunice mutilata Webster, 1884, p. 315, plate 9, figures 36–40.
Leodice mutilata Verrill, 1900, p. 639.
Eunice barvicensis? McIntosh, 1885, p. 292, plate XXXIX, figure 12; plate XXI A, figures 1–3.

A long, rather slender species, always much more slender toward the posterior than toward the anterior end. The one figured (plate 3, figure 5) was nearly 250 mm. long, with a peristomial diameter of 4 mm. and about 350 somites.

The general color of living animals is a reddish brown alike on dorsal and ventral surfaces, though the tint is lighter ventrally and there are numerous yellow spots over the entire surface, but more numerous toward the posterior regions. The tips of the tentacles and all cirri are white, and a white nuchal band occurs on the fifth somite. Specimens collected in Bermuda in 1916 varied from a light to a dark chocolate-brown, and the larger individuals were without the nuchal band. Very young individuals were very dark brown with numerous fine white specks over the surface. In these the nuchal band was an intense white and the tips of the tentacles were also very noticeable in their white coloring. The dark-brown or purple banding of these young animals is preserved in the coloring of the posterior somites in even the largest specimens. The general reddish color, especially of the anterior end, and the white spotting are preserved in alcoholic material. Living adult males are of a dirty yellow color in the middle region of the body.

The prostomium is chestnut-colored with white margins (plate 3, figure 6). The median tentacle extends to about the anterior border of the fourth somite, the paired ones being about equal to each other and a little shorter than the median. The relative length of all of the tentacles is dependent on the degree of expansion of the entire animal. The tips of all tentacles are white, a constant feature in this species. The peristomium is a little broader than the prostomium and a little darker in shade. Lateral notches

mark off a prominent lower lip. The second somite is about equal to the third in length, but not more than one-quarter as long as the first. The nuchal cirri are slender and colorless and extend to the anterior border of the first somite. The dorsal cirri are all colorless and rather inconspicuous and there is a single pair of anal cirri which are colorless except for faint yellow bands (plate 3, figure 8).

The gills are very prominent throughout the anterior region of the body, and show very great variation in their structure. They begin on somite 6 or 7 with 1 filament; in later somites other filaments are added (plate 3, figure 7), but the number of these filaments, so far as I can judge from Webster's description and my own observations, is very variable and depends on the size of the animal. The largest number in Webster's specimens was 4 on somites 16 to 37. In a Bermuda specimen I found 6 on somite 23. One Tortugas specimen had 4 to 7 filaments on somites 17 to 38, while another and larger individual had 10 to 14 on somites 13 to 37. Behind this region there is a reduction in number in all individuals, but the gills continue to the posterior end. Bifid filaments are not uncommon.

The first parapodium (text-figure 66) has a short presetal and a longer postsetal lobe and a relatively prominent dorsal cirrus, seven or eight times as long as the setal lobe. The ventral cirrus has an oval outline, is about twice as long as the setal portion, and is attached for nearly the entire length of the latter. In life the brownish pigment extends on to the dorsal surface of the parapodium, but in alcoholic material only two brown patches remain. There are two aciculæ in the setal portion and a tuft of needle aciculæ in the base of the dorsal cirrus. The tenth parapodium (text-figure 67) shows a much larger setal lobe than did the first, but the anterior and posterior lips are essentially of the same form. The dorsal and ventral cirri are smaller than in the first parapodium, the latter being nearly triangular in form and carried on the end of a swollen base. The gill is attached at the base of the dorsal cirrus and has a large main stem from which the filaments arise. This figure was drawn from a large specimen, with a large number of gill-filaments. In most cases there would not be as many as nine of these on the tenth parapodium. There are two large aciculæ in the setal portion, and a tuft of needle setæ in the base of the dorsal cirrus.

Behind the twenty-seventh somite a ventral acicula is added to the parapodia, and the pad on the ventral cirrus disappears at about the fifty-second. The seventieth parapodium (text-figure 68) is very much smaller than either of the other two figured, and while the setal lobe is not so very different in form there is a noticeable decrease in the size of the cirri and the gills are much more slender. The figure was drawn from a large specimen; in smaller ones there would be only one filament. I was unable to find any needle aciculæ in the posterior somites. The twentieth parapodium from the posterior end (text-figure 69) has lost the distinction between the setal lobes and the gill is very small and to be distinguished from the cirrus only by the central blood-vessel in the gill. The ventral cirrus is short and thick.

The simple setæ are of two kinds, one (text-figure 70) noticeably curved to an acute point and striated along one or both edges. The others are not so much curved, and their central portion is thicker, with a minutely striated keel along both margins (text-figure 71). It is probable that these represent extremes of variation of the same form of seta.

The compound setæ (text-figure 72) have a rather stout base, which is widened and truncated at the apex, the terminal joint of each being rather short and provided with an apical and a subapical tooth, the whole covered with a striated hood. The pectinate setæ (text-figure 73) have from 12 to 15 teeth, the terminal one at one end being longer than at the other. These forms of setæ occur throughout the body, but in the median region the shafts are longer and the number of setæ greater. The dorsal aciculæ have simply rounded ends, but the ventral ones (text-figure 74) have bifid ends covered with a

striated hood. The apex of the acicula is colorless, but for most of its length it is a dark-brown color.

The jaw apparatus is dark. The maxilla (text-figure 75) has short carriers with long forceps, the whole being much darker than the plates. The proximal paired plate

TEXT-FIGURES 66 to 76. *Leodice mutilata* Webster.

66. First parapodium ×30.
67. Tenth parapodium ×21.
68. Seventieth parapodium ×21.
69. Twentieth parapodium in front of pygidium ×21.
70. Simple seta ×230.
71. Detail of simple seta ×390.
72. Compound seta ×370.
73. Pectinate seta ×370.
74. Acicula ×370.
75. Maxilla ×21.
76. Mandible ×21.

TEXT-FIGURES 77 to 84. *Leodice floridana* Pourtales.

77. Middle parapodium ×20.
78. Simple seta ×60.
79. Detail of simple seta ×666.
80. Compound seta ×250.
81. Pectinate seta ×340.
82. Dorsal acicula ×140.
83. Ventral acicula ×140.
84. Pygidium with anal cirrus ×10.

on either side has 5 teeth, the distal paired have 10 on the right and 5 on the left, the unpaired has 9. Smaller specimens had on the right and left proximal plates 3 and 4 and 4 and 5, respectively, there evidently being some variation in this respect. There are small plates lateral to the paired and pigment patches distal to the whole. The mandible (text-figure 76) has acutely pointed shafts marked by longitudinal dark and light-brown bands which are continued on to the beveled portion, this latter being also marked by concentric brown lines.

In the Tortugas this species is rather rare, but in 1916 I found it in great abundance in Bermuda, living in the crevices of the eroded coral rock just below low-water mark. I have also collected it at San Juan and Guanica in Porto Rico, in Montego Bay, Jamaica, and in Tobago; it was found in Andros Island in the Bahamas by Dahlgren and Muller, of the American Museum of Natural History; in St. Thomas by Shoemaker, of the U. S. National Museum; and in Dominica by A. H. Verrill. At the Dry Tortugas I have found it not only in rocks near low-water mark, but have dredged it in 8 to 10 fathoms 7 miles south of Loggerhead Light.

Verrill identified *Leodice mutilata* with *Eunice barvicensis* of McIntosh, which was described from mutilated specimens in which the structure of the head was not to be clearly distinguished. From his description of the dental apparatus and gills I would say McIntosh perhaps had an immature form of this species, a conclusion that would be strengthened by the size of his specimens as given in his measurements.

Leodice sp. (floridana Pourtales?).

(Text-figures 77 to 84.)

Marphysa floridana Pourtales, 1863–1869, p. 108.
Eunice floridana Ehlers, 1887, p. 88, plate 22, figures 1–7.
Eunice floridana McIntosh, 1910, p. 439, plate LXV, figures 7, 7*b*; plate LXXV, figures 2, 2*a*; plate LXXXIII, figures 10, 10*b*.
Eunice floridana Fauvel, 1914*b*, p. 149, plate I, figures 5, 8, 11; plate XI, figures 22–26.

Other references to the literature of this species may be found in the last two items, but these are the only ones of especial interest in the present discussion.

Fragments of two specimens of a *Leodice* were dredged in 1915 about 10 miles south of Loggerhead Key in the Dry Tortugas, in about 15 fathoms. Neither fragment retained the head, the better preserved of the two having only about 125 of the posterior somites. In general appearance it somewhat resembled *L. longicirrata* (see page 11), but differed in that the gills are continued to within 6 somites of the posterior end. Like *L. longicirrata* also, the cirri are long and slender. *Leodice floridana* has a gill arrangement like this, and I have compared these specimens with some that I have identified as the latter species, collected by the *Albatross* at 31° 09″ N., 79° 33′ 30″ W., in 352 fathoms. The two differ in general appearance, but perhaps no more so than could be explained by differences in the mode of preservation, and a detailed examination of corresponding parapodia showed a general agreement, especially in the large size and dark color of the aciculæ, the size of the gills, and the structure of the setæ. The cirri of the Tortugas material were longer than in the others, but this may have been due to differences in preservation. The most important difference relates to the structure of the anal cirri. These (text-figure 84, the only one preserved) are moniliform with 7 joints. Ehlers (1887, p. 89) says that the anal cirri of *L. floridana* are "not at all" annulated. Fauvel (1914*b*, p. 149) describes them as smooth; Pruvot and Racovitza (1895, p. 398) say that the longer cirri are "subulate"; and McIntosh (1910, p. 439) says that the tentacles are "slightly annulated but no other process is so," though his figure (plate LXV, figure 7) shows the nuchal and several pairs of dorsal cirri as *strongly* articulated. A specimen from the *Albatross* collection had two pairs of anal cirri, one pair short and

leaf-like, the other much longer and, due to imperfect preservation, much flattened. In it could be seen a definite jointing, though not a moniliform structure. If the Tortugas specimen were *L. floridana*, parts of the tube would probably have been dredged with the animal, but no trace of it appeared. I have thought it best to record what is possible of its structure in the hope that later collecting may furnish material on which to determine its exact position.

A middle parapodium of the fragment (text-figure 77) shows a long dorsal cirrus (in which I could find no trace of articulations) and the ventral cirrus of the form most common in the fragment. The posterior lip of the setal lobe is only a little more prominent than the anterior, and there are two very dark, straight aciculæ and one ventral hooked one. All aciculæ are very dark-colored and prominent, though slightly smaller in my Tortugas material than in the *Albatross* specimens. Like *L. longicirrata*, there is a dark-brown spot near the base of the dorsal cirrus, but this is lighter than in *longicirrata*, and is accompanied by a ventral one, not represented in that species. At the posterior end all cirri are long and prominent, the dorsal ones as long as in earlier somites, the ventral ones very slender.

The simple setæ (text-figure 78) are very long and slender, slightly expanded toward the apex and sharp-pointed. Along one edge the expanded portion is very finely denticulated, a feature which shows only under high power (text-figure 79). The compound setæ are large, with heavy bases slightly broadened toward the end, and with plainly marked denticulations along one edge (text-figure 80). Each terminal joint is relatively very small, has an apical and a subapical tooth, and is covered by a small denticulated hood. The pectinate setæ (text-figure 81) have about 15 teeth, the terminal tooth at one end being slightly longer than at the other. The dorsal acicula (text-figure 82) is dark to the very end, having only a very narrow marginal lighter band. The ventral one (text-figure 83) has a much broader marginal light band, is bifid, with the subterminal tooth a little the larger, and a rather small hood.

The pygidium retained but one anal cirrus (text-figure 84), which had 7 joints.

The gills are always shorter than the dorsal cirrus and rather heavy. I found none with more than 4 filaments (text-figure 77). The number gradually decreases toward the posterior end, the last ones having only a single filament.

Leodice rubrivittata, new species.

(Plate 1, figure 18; text-figures 85 to 94.)

A small species with approximately 150 somites and a body length of 80 mm. The prostomial diameter is about 0.5 mm., but at its widest part the body diameter may be 2 mm.

The most noticeable feature of the living animal is the arrangement of pigment. On the prostomium are two reddish-brown or orange pigment patches extending from the median line just inside the eyes to the antero-lateral border. On the posterior border of the prostomium are other patches partly covered by the peristomial margin. On the dorsal surface of the peristomium is a single pair of pigment patches, on the dorsal surface of the second somite are four, and this structure is repeated in the somites immediately following, but in later somites the patches unite to form a continuous transverse band. These are usually orange-colored in the anterior somites and reddish-brown farther back. Behind somite 40 the pigment is in the form of faint dots in the mid-dorsal line and on the parapodia, while behind the region of somite 50 they disappear entirely and the whole body is a pearly white with a dark spot at the base of each parapodium. The pigment is retained in preserved material.

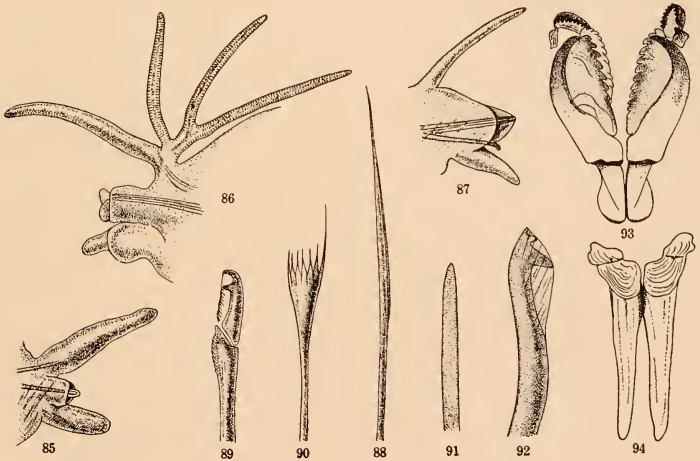
The prostomium (plate 1, figure 18) is only very faintly bilobed, the median cleft being almost invisible from above. The tentacles are long, the median reaching as far

as the seventh somite. They are all jointed, the median with about 13 joints, the inner paired with 12, and the outer paired with 6. In addition to the true joints, surface wrinklings simulate articulations. The basal joints are the longest, the terminal ones becoming almost moniliform. The tentacles are all very delicate in appearance and are colorless or with a very faint suggestion of pink.

The peristomium is hardly broader than the second somite (plate 1, figure 18). The nuchal cirri extend beyond the anterior border of the peristomium and have 7 or 8 joints.

The first parapodium (text-figure 85) has prominent cirri, the dorsal being about three times as long as the ventral. The setal lobe has a cirrus-like apex into which the acicula extends and there are needle aciculæ in the dorsal cirrus. The tenth parapodium (text-figure 86) has a very long and slender dorsal cirrus, the ventral cirrus a short process on the end of a swelling. The end of the setal lobe is drawn out into two processes, but the aciculæ do not extend into them. There are a few small needle aciculæ. A posterior parapodium (text-figure 87, region of the sixtieth) also has slender cirri, a rounded anterior and posterior lip, very similar in form, and an elongated conical setal lobe, into which the aciculæ extend. There is a ventral acicula, but I could find no needle forms in the dorsal cirrus. The dorsal cirri are often wrinkled and simulate articulations, but true articulation does not appear. There are two pairs of very delicate anal cirri, one pair very much larger than the other.

The simple setæ (text-figure 88) are very delicate, sharp-pointed structures. In some, as in the one figured, there is a narrow marginal wing, but I could not find it in



TEXT-FIGURES 85 to 94. *Leodice rubrivittata* Treadwell.

85. First parapodium ×160.
86. Tenth parapodium ×80.
87. Posterior parapodium ×80.
88. Simple seta. ×120
89. Compound seta ×120.
90. Pectinate seta ×120.
91. Dorsal acicula ×120.
92. Ventral acicula ×120.
93. Maxilla ×32.
94. Mandible ×32.

all. The compound setæ (text-figure 89) are very small, each with a small terminal joint having apical and subapical teeth, but no basal tooth. The terminal joint is covered by a hood, which is only faintly serrated in the anterior somites, but this becomes more noticeable farther back. The apex of the basal joint is also serrated. The pectinate setæ (text-figure 90) are small and delicate, with 6 to 8 relatively rather prominent teeth. The dorsal acicula (text-figure 91) is slender, blunt-pointed, and a very faint yellow in color. The ventral ones which appear in later somites have a very small terminal tooth, a second proximal to this, and a much larger one proximal to this. The whole is much heavier and denser-colored than is the case with the dorsal (text-figure 92).

The gills begin as a single filament on the third parapodium. By the seventh there are 2 filaments and by the tenth or eleventh there are 3. On the thirteenth there may be 4 and they are present as far as the fiftieth parapodium. Between the fortieth and the fiftieth there may be as many as 5 filaments. They are always very delicate and never very bright red, so that in the living animal they are never conspicuous. The dorsal cirri are always more prominent than the gills, but behind the gill region they become very inconspicuous.

The maxilla (text-figure 93) is very delicate with short carriers, having broad wings and stout forceps, whose apices are narrow. The asymmetrical appearance of the forceps in the figure is due to the fact that the right half had been partly rolled so as to show its flattened surface. The right proximal paired plate has 11 teeth and the left has 8; the unpaired has 10. The distal paired plates have each as many as 11 teeth, which are not all shown in the figure, since the plates are partly covered by others. The maxilla is a light brown in color except for the tips of the forceps, a basal band on each half of the forceps, and the distal paired plates. The mandible (text-figure 94) is almost colorless, the only pigment being along the line of junction of the two halves. The beveled portion is marked by very fine concentric lines. *L. rubrivittata* resembles *L. unifrons* of Verrill (see p. 17) in the form of its prostomium, in the extreme delicacy of its structure, so that it is almost impossible to secure an unbroken specimen, and in its mode of life. It lives in tubes composed of bits of pebbles fastened together on the under side of stones, these tubes being usually many times as long as the animal and extending for considerable distances over the rocks.

Collected in March and April 1918 on rocks at Buccoo Reef, Tobago.

Type in American Museum of Natural History.

Leodice binominata Quatrefages.

(Plate 3, figures 9 to 12; text-figures 95 to 106.)

Eunice punctata Grube, 1856, p. 59. (Name preoccupied.)
Eunice binominata Quatrefages, 1865*a*, volume 1, p. 327.
Eunice binominata Ehlers, 1887, p. 85.
Leodice binominata Verrill, 1900, p. 640.
Eunice binominata Augener, 1906, p. 132, plate 4, figures 60–63.

During life the body is characterized as to color by a mottling of browns, yellows and reds, the latter effect being heightened by the color of the gills in the anterior region of the body (plate 3, figures 9 to 12). The prostomium is rounded in front with little lobing, its surface marked in life by orange-red on a yellowish-white background. This general color is continued on later somites, but largely because of the color of the intestinal contents the middle region of the body is usually darker, and posteriorly it may become nearly purple. Beginning with the sixth or seventh, each somite bears on its median dorsal surface a collection of small white spots which together make up a white patch, and these patches are continued throughout the body, while smaller white spots are scattered over the entire dorsal surface. The second somite has a white band across

its posterior edge. The antennæ are marked with brown bands, much as in *L. longicirrata*, and the white patches make it resemble *L. rubra*. In life the color is diagnostic, but in alcoholic material the three species might be confused. *L. binominata* may be distinguished from *rubra* by the possession of longer tentacles and fewer gills and from *longicirrata* by the presence of the white patches.

The length of my Tortugas specimens was 50 mm., while one collected in Bermuda measured 80 mm. after preservation.

The median tentacle (plate 3, figure 10) may extend to as far as the fifteenth somite. It has as many as 26 articulations and is moniliform at the apex. The inner paired are about three-quarters of the length of the median, the outer paired not more than half as long as the inner, and they are all articulated. The nuchal cirri extend to the anterior margin of the peristomium, are articulated, and in life are banded with flake-white and brown. The other cirri throughout the body are relatively large, and there is a single pair of anal cirri, which are banded with brown, but (as may be seen on preserved material) are only obscurely articulated (plate 3, figure 12).

The prostomium is described above. The peristomium (plate 3, figure 10) is wider than the prostomium and about twice as long as somite 2. Later somites increase in width to about the middle of the body, and thence there is a gradual decrease to the posterior end.

The gills are restricted to the anterior end of the body, lying (in all the specimens I have examined) between somites 7 and 35. Beginning with 1 or 2 filaments on somite 7, the number increases rapidly (plate 3, figure 11) and with some regularity to as many as 12 on somite 14. One individual showed 12 as the maximum number on somites 14 and 26, while somite 18 had only 9. Another had 13 filaments on somite 18. The last gills are on somites 33 to 36. The filaments are always rather heavy, but are always more slender than the dorsal cirrus (text-figure 95).

The first parapodium (text-figure 96) has a setal portion with a rounded posterior lip and two rather long aciculæ toward its dorsal surface. The dorsal cirrus shows an articulation near the end, and a tuft of needle aciculæ extends into its base. The ventral cirrus in the specimen figured had been flattened by the pressure of the cover-glass and is really more globular toward the base than is represented, approaching in this respect the condition in the eleventh. The eleventh parapodium (text-figure 95) has a rounded post-setal lobe with two rather heavy aciculæ toward its dorsal surface. The dorsal cirrus has a single articulation near its middle and a constriction near the apex, this latter not being a true articulation. There is an obscure pigment spot near its base and a tuft of needle aciculæ extends into it. The ventral cirrus has a globular base, its terminal portion being rather slender.

A parapodium from the middle of the body behind the gills (text-figure 97) has two dorsal aciculæ protruding between the setal lobes and a ventral one just dorsal to the ventral cirrus. The dorsal cirrus is slender and not articulated, while the ventral one retains a trace of its globular base, but is otherwise slender. Pigment spots are scattered over the surface of the entire parapodium and needle aciculæ occur in the dorsal cirrus. Toward the posterior end of the body the parapodia have essentially the same structure as in the last, but the dorsal cirri are absolutely as well as relatively longer than in those farther forward, so that they are more prominent in the posterior regions.

The simple setæ (text-figure 98) are long and slender, only slightly curved, and with minute denticulations along their expanded portion. The compound setæ (text-figure 99) have large basal joints, the terminal joints small. The latter have equal apical and subapical teeth and a smooth hood. The apex of the basal joint is rounded and tooth-like, and there are minute denticulations proximal to it. The pectinate setæ (text-figure 100) have a few (about 8) rather large teeth.

The anterior aciculæ are rather small and have rounded ends (text-figure 101). One from either the first or second parapodium had its end drawn out into a fine point (text-figure 102). Many of these aciculæ were broken at the ends, and I am not certain how often this pointed structure occurs. Posteriorly the dorsal aciculæ become larger and at the extreme posterior end show a bifid apex (text-figure 103). Through the median region the ventral aciculæ have a terminal tooth with a larger subterminal one ventral to it, but at the posterior end they have trifid apices (text-figure 104).

For an animal of this size, the maxilla is unusually delicate and soft. The carrier (text-figure 105) is almost semicircular in form, with its outer margins thin and transparent. The base of the forceps is rather heavy, but the terminal portions are slender. Each proximal paired plate has 8 teeth, the distal paired have 8 on the left and 11 on the right, while the unpaired has 8. Except for a dark band between the halves of the carrier and at the base of the forceps, the maxilla is very light brown in color, though the teeth are darker. Two crescentic pigment patches occur distal to the plates. The mandible (text-figure 106) is colored much like the maxilla, the beveled portion having concentric brown lines, and similar lines occur on an expansion which extends forward from this beveled portion. In the specimen the margins of the mandibular shafts are not as sharply defined as I have indicated, the development of a marginal plate of chitin making the outline more indistinct.

The specimen from which Grube's original description was made was collected at St. Croix. Quatrefages renamed it *binominata* ("Eunice a deux noms") because the name "*punctata*" had been earlier given to a Mediterranean species; but Quatrefages

TEXT-FIGURES 95 to 106. *Leodice binominata* Quatrefages.

95. Eleventh parapodium ×424.
96. First parapodium ×24.
97. Middle parapodium ×24.
98. Simple seta ×370.
99. Compound seta ×370.
100. Pectinate seta ×370.
101. Anterior acicula ×370.
102. Second form of anterior acicula ×370.
103. Posterior acicula ×370.
104. Second form of posterior acicula ×370.
105. Maxilla ×18.
106. Mandible ×18.

saw no other specimens. Verrill lists it from Bermuda and I collected it at Tucker's Bay, Bermuda, and in the Dry Tortugas. It is not common in either locality, as I found only one individual in Bermuda and not over six in five seasons' collecting at the Dry Tortugas. Augener's specimens were collected from Barbados at 69 fathoms and Santa Cruz at 115 fathoms. Ehlers's were collected at the Tortugas and at latitude 24° 43′ N., longitude 83° 25′ W., in 37 fathoms.

Leodice guanica, new species.

(Plate 2, figures 9 to 12; text-figures 107 to 116.)

The first specimen collected was small, 70 mm. long, with 95 somites, and a head-width of 2 mm.; figures 10 to 12, plate 2, were drawn from it. Larger individuals were obtained later, and figure 9 was drawn from one of them. In the smaller specimens the entire animal has a decidedly greenish tinge, though as seen under high power this is more intense in the anterior than in the middle or posterior region. In the larger specimens the tentacles were colorless except for narrow brown bands which sometimes seem to extend entirely around the tentacle. In the larger specimen the anterior region of the body is a dark-brown color, with the sixth somite uncolored dorsally. The nuchal cirri are colorless and much shorter than the peristomium. The eyes are large and of a purple color. The prostomium varies in the two specimens, being large and green in the smaller and much smaller and reddish brown in the larger. The peristomium structure differs also in the two individuals, as may be seen by a comparison of figure 9 with figure 10. A comparison of these figures would lead to the conclusion that the two are of entirely different species, but from a careful study of the two animals I am convinced that they are really the same.

The first parapodium (text-figure 107) has relatively large dorsal and ventral cirri with needle aciculæ in the former and large aciculæ in the setal lobe. The tenth parapodium (text-figure 108) has an anterior and posterior lip and two large aciculæ. The dorsal cirrus is lanceolate with needle aciculæ; the ventral cirrus is a rounded conical lobe on a basal swelling. A parapodium from the middle of the body shows a very great reduction in the size of the cirri, the dorsal being much smaller than the single gill-filament and the ventral a conical lobe on the lower surface (text-figure 109). The setal lobes are low and equal and there is a ventral hooked acicula not represented in anterior somites. There are two pairs of very unequal anal cirri (plate 2, figure 12).

The gills begin on about the seventeenth somite and continue to the extreme posterior end of the body, being relatively more prominent posteriorly. In most cases there is but a single filament (text-figure 109), though some may be bifid (plate 2, figure 11). They are always much more prominent than the dorsal cirrus.

The simple setæ (text-figure 110) are expanded and curved toward the ends, without denticulations, the apices being very fine-pointed. The compound setæ (text-figure 111) have each a basal joint with the apex slightly expanded and very minutely denticulated, the terminal joint with 2 equal teeth (apical and subapical) covered by a denticulated hood. The pectinate setæ (text-figure 112) have about 13 teeth, the terminal ones the longer.

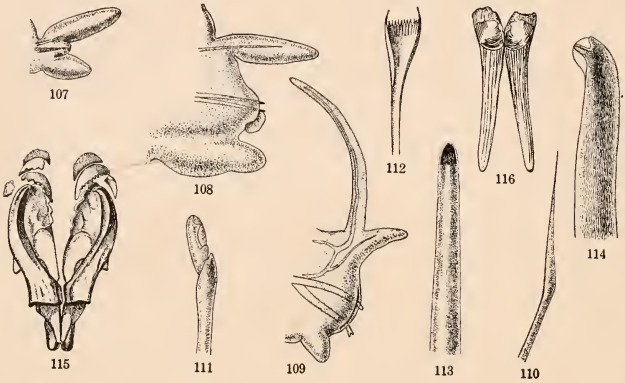
The aciculæ are light brown, the apex of the simple one being much darker than the shaft (text-figure 113). Throughout the middle and posterior region of the body a second form of acicula occurs with a curved and bidentate apex. This does not show as dark a tip as do the others (text-figure 114).

The maxilla (text-figure 115) is grayish brown with darker edges. The carrier is small, the forceps rather large and heavy. Each proximal paired plate has 4 teeth, the distal paired have 9 on the right and 4 on the left, the unpaired has 4. There are

accessory plates and crescentic pigment patches, the latter dark brown. The mandible has slender shafts, the terminal beveled portion with concentric brown lines and an anterior marginal expansion (text-figure 116).

Collected at Guanica Harbor and near Fort Geronimo in Condado Bay, Porto Rico, at Sand Key off Key West Harbor, Florida, and in Montego Bay, Jamaica.

The type is from Sand Key and is in the American Museum of Natural History.



TEXT-FIGURES 107 to 116. *Leodice guanica* Treadwell.

107. First parapodium ×34.
108. Tenth parapodium ×34.
109. Thirty-fifth parapodium ×34.
110. Simple seta ×205.
111. Compound seta ×193.
112. Pectinate seta ×310.
113. Simple acicula ×193.
114. Hooked acicula ×193.
115. Mandible ×20.
116. Maxilla ×20.

Leodice filamentosa Grube.

(Plate 1, figures 14 to 17; text-figures 117 to 126.)

Eunice filamentosa Grube, 1856, p. 56.
Eunice hamata Schmarda, 1861, p. 125, with text-figures.

The individual figured (plate 1, figure 14) was 150 mm. long, with a head-width of 2 mm., and had 320 somites.

The anterior region of the living animal has a coloration due to a combination of a brownish pigment, a pearly white luster, and considerable iridescence. The fifth and sixth somites are without pigment and hence appear white. Behind about somite 20 the body is mostly a pearly gray, more or less modified by the color of the intestinal contents and the blood, seen through the body-wall. The ventral surface is colored throughout like the dorsal posterior region.

The prostomium (plate 1, figure 15) is very distinctly four-lobed with reddish spots on its dorsal surface. The tentacles are supported on rather large cirrophores and are very long, the median reaching to the eighth somite. The inner lateral are shorter than the median and the outer lateral are not more than half as long as the median. The median and inner paired are marked with numerous brown spots; the outer paired are colorless.

The peristomium (plate 1, figure 15) is three times as long as the prostomium and is nearly rectangular in dorsal view. The second somite is very short, its nuchal cirri rather small, not reaching to the margin of the peristomium, and are colorless. Later somites are a little broader, but back of the middle of the body they become narrow, the whole posterior region being very slender. There is one pair of long anal cirri (plate 1, figure 17).

The first parapodium has a well-developed setal lobe with a conical postsetal lip. The dorsal cirrus has needle aciculæ in its base, and a large acicula protrudes from the setal portion. The tenth parapodium (text-figure 117) has a high setal portion with pointed posterior lip and has several aciculæ protruding from the apex of the setal portion. The dorsal cirrus is long and slender with rather stout needle aciculæ in its base, while the ventral one is a rounded cone on the end of a globular swelling. A parapodium from the middle of the body (text-figure 118) has a small posterior lip and two aciculæ, both dark in color and the ventral one bifid at the end (text-figure 119). The dorsal cirrus is small, with a rather broad base, and has at the base a ventral swelling which is evidently a sense-organ similar to that described in *Eunice auriculata* (Treadwell, 1901, p. 197, figures 34, 35). Its terminal portion is slender and short. The long, narrow gill-filaments arise from the base of the cirrus. The ventral cirrus is similar to those in the anterior parapodia, but smaller. In the specimen drawn, the ventral cirrus had been bent under the setal portion and is not well shown. The posterior parapodia (text-figure 120), drawn to a larger scale than the others, have a rounder anterior and a pointed posterior lip and two prominent aciculæ. The dorsal cirrus is long and slender, the ventral much shorter, but not on a globular base.

The simple setæ (text-figure 121) are long and slender, tapering to acute points with a wing on either edge. Each compound setæ (text-figure 122) has the apex of the basal joint enlarged and striated, the distal joint being rather slender, with rounded apical and subapical teeth covered by a hood. The margin of the hood is striated. The pectinate setæ (text-figure 123) have an unusually broad end with about fourteen prominent teeth the terminal ones the largest. The dorsal aciculæ (text-figure 124) have bluntly pointed ends and very dark shafts, only the extreme tip being uncolored. The ventral ones are similar to these in color, but have a forked (not toothed) apex without a hood (text-figure 119).

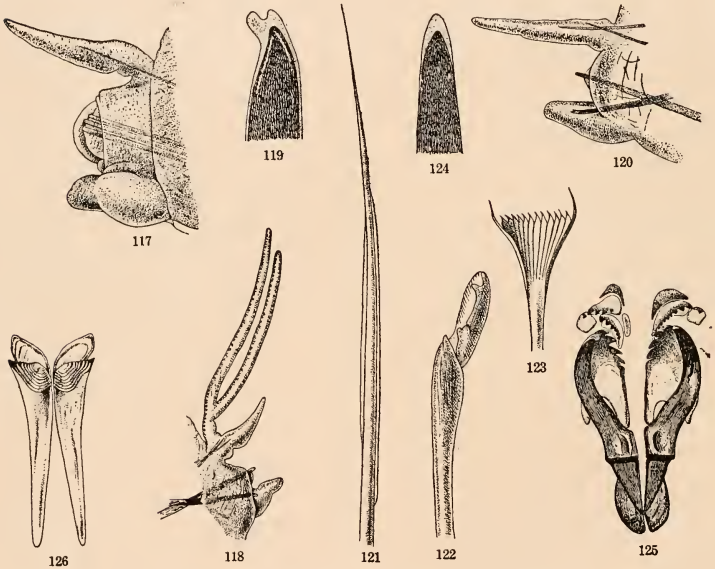
The gills begin in about the region of somite 30, at first as a single short filament, but there is a rapid increase in length in succeeding somites, so that the tenth gill is more than half as long as the diameter of the body. Between the fortieth and fiftieth somites a second filament appears, and this number is continued throughout the greater part of the remainder of the body (plate 1, figure 16; text-figure 118).

The maxilla is brown in color (text-figure 125). The carrier is rather long, the forceps rather slender, each half with a dark-colored depression near the base, and the apex very dark. The promixal paired plates have each 4 large teeth, the basal portions of the plates much lighter in color than the terminal. The distal paired plates have 9 teeth on the right, 3 large and 1 small on the left; the unpaired plate has 3 large and 3 small. An accessory plate with an incurved corner lies lateral to the plates and there are light-brown crescentic patches distal to them. The mandible (text-figure 126) has slender, almost colorless shafts, the beveled portion with dark-brown concentric lines and prominent distal expansions on either side.

My specimens did not correspond in all details with the descriptions by either Schmarda or Grube. Both gave only the briefest diagnoses, and Grube published no figures; moreover, Schmarda's *description* of the jaw would apply to any species of this genus. He states that there is no ventral cirrus, which is evidently an error, and that the gills arise as bifid structures about the middle of the body. In those I have they

become bifid at about this point, but arise much earlier. His figures of the setæ and of the gill-bearing parapodia are similar to mine, and the jaw apparatus which he figures is not so very different from mine. With Grube's description my specimens agreed more closely, though I do not see the resemblance to *L. caribæa* which he mentions. Identification of one species with another in reliance on the belief that where there is lack of agreement it is because of errors in the original description is rather an unsatisfactory performance, but it seems to be justified in this case.

Schmarda's specimens were collected in the south of Jamaica. Grube's were from St. Croix. I found it in July 1914, in soft coquina rock on the eastern shore of Loggerhead Key and in mud among water plants at the southern end of Tuckerstown Bay, Bermuda, in 1916. The Yale University Museum has one specimen collected in Bermuda by Coe in 1903.



TEXT-FIGURES 117 to 126. *Leodice filamentosa* Grube.

117. Tenth parapodium ×34.
118. Middle parapodium ×24.
119. Forked acicula ×193.
120. Posterior parapodium ×55.
121. Simple seta ×245.
122. Compound seta ×245.
123. Pectinate seta ×245.
124. Simple acicula ×193.
125. Maxilla ×27.
126. Mandible ×27.

Leodice fucata Ehlers.

(Plate 4, figures 5 to 10; text-figures 127 to 135.)

Eunice fucata Ehlers, 1887, p. 91, plate 25, figures 1–20.
Eunice fucata Treadwell, 1901, p. 196.
Staurocephalus gregaricus Mayer, 1900, p. 1, plate 1, figures 1–9; plate 2, figures 10–17; plate 3, figures 18–27.
The Atlantic Palolo (*Eunice fucata*), Mayer, 1902, p. 93, with 1 plate.

A large, though rather slender, species; one female approaching maturity had a body-length of 673 mm. and was composed of over 500 somites.

In the living animal the anterior face of the prostomium is a pale green and very iridescent (plate 4, figure 5), while between the bases of the tentacles it has a pearly luster. The cirrophores of the tentacles are a reddish brown, while the greater part of the tentacles are a lighter brown washed with green but with colorless apices. The nuchal cirri are a very light green, darker for the terminal quarter but with apices uncolored, and the dorsal cirri for about the first 20 somites are colored like these, while later ones are uncolored. The peristomium (plate 4, figures 5 and 6) is very iridescent, but with more or less brown and green, and this condition is continued on to later somites, so that the general effect is that of a decidedly green animal. As far back as about somite 40 there is a faint transverse white band in each somite. At this point a white spot appears in the mid-dorsal line, at first of only an occasional somite, but later is present in all and persists to the extreme posterior end of the body, while the band disappears. In mature animals there is a sharp line between the sexual and non-sexual regions (plate 4, figure 5), the sex region of the male being a bright coral-pink and the female a sage-green (plate 4, figure 10). These colors are due to the sex products seen through the body-wall (plate 4, figure 8). The extreme posterior end is free from sex products and is wine-red in color (plate 4, figure 9). The ventral surface is like the corresponding dorsal, but lighter. Immature individuals have almost the same color as adults.

The prostomium (plate 4, figure 6) is rounded and distinctly bilobed, each lobe being further divided into a small dorsal and a larger ventral one. The tentacles all taper gently to a bluntly rounded apex, the median one being the longest and reaching to the fourth somite. The inner paired tentacles are a very little longer than the outer and reach to the third somite. The eyes are large and black.

The peristomium is colored as described above. In living material its anterio-posterior diameter is usually longer than the transverse, but this varies in life and in the one drawn its outline was nearly square. The second somite is very short, its nuchal cirri reaching to the anterior border of the peristomium (plate 4, figure 6). Later dorsal cirri are similar to the nuchal, and they are prominent throughout the body, though smaller posteriorly than anteriorly. There is one pair of rather small anal cirri (plate 4, figure 9). Throughout most of the body the somites are broader than long and the intersegmental constrictions figured by Ehlers are not present in living specimens.

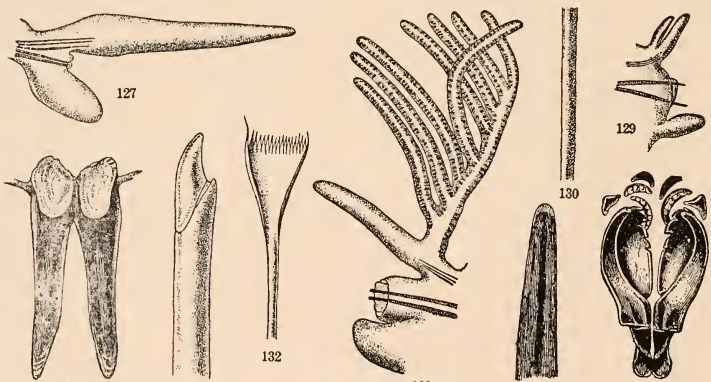
The first parapodium (text-figure 127) has a small setal portion with large dorsal and ventral cirri. There are two aciculæ in the setal portion and relatively very large needle aciculæ in the dorsal cirrus. The tenth parapodium (text-figure 128) has practically equal lips with a setal elevation between and protruding aciculæ. The dorsal cirrus is rather large and carries the broad gill near its base. The ventral cirrus is hardly longer than the parapodium, is very thick and fleshy, and has a broad base of attachment. The two-hundredth parapodium (text-figure 129) shows a pointed posterior lip and dorsal and ventral aciculæ. The dorsal cirrus is relatively smaller and the ventral ones relatively larger than anteriorly, and the dorsal cirrus carries a very small gill. Needle aciculæ occur at the bases of all dorsal cirri.

The gills begin on the fifth setigerous somite. I have found individuals with only 1 or 2 branches on this somite, but there are usually more. Two specimens from the Dry Tortugas, of approximately the same size, had respectively 5 and 12 branches on this first gill. There is very great irregularity in the structure of the gills in that filaments may branch or the number of filaments be very unequal in different individuals. Between the fifth and eighteenth somites the number may be as great as 18; from here backward there is a decrease in number, but gills may extend beyond the two-hundredth somite.

The simple setæ are very long and slender, with a finely toothed margin on the shaft (text-figure 130, showing only a detail of the shaft). The compound setæ (text-figure 131) have very long and heavy basal portions, the terminal joints being small and without teeth. This terminal joint is apparently easily broken away, for it is always hard to find a seta in perfect condition. The pectinate setæ (text-figure 132) have narrow shafts and broad ends, with about 18 teeth, the terminal ones being longer than the others. The aciculæ (text-figure 133) are uniform in character throughout the body, are brown, bluntly rounded at the end, and none is toothed or hooded.

The maxilla (text-figure 134) is almost black, the carriers short and narrow, the forceps heavy. Each proximal paired plate has a small apical and 4 other much larger teeth. The distal paired plates have 7 teeth on the right and 4 on the left; the unpaired has 7. Small, dark patches occur in two pairs, lateral and distal to the distal paired plates. The mandible (text-figure 135) has very dark, rather heavy shafts, and the beveled surface is covered with white.

Leodice fucata was described by Ehlers, with whose description my specimens agree except in some minor details. As stated above, the intersegmental depressions which he figured are due to the preservation, and on the terminal joint of the compound setæ



TEXT-FIGURES 127 to 135. *Leodice fucata* Ehlers.

127. First parapodium ×20.
128. Tenth parapodium ×20.
129. Two-hundredth parapodium ×30.
130. Detail of simple seta ×310.
131. Compound seta ×310.
132. Pectinate seta ×310.
133. Acicula ×310.
134. Maxilla ×10.
135. Mandible ×10.

he figures minute denticulations which I did not find. He figures also two of the gills with branching filaments which are described above. Mayer later (1902 and 1908) added some details to Ehlers's description, and published colored figures of the animal. In another paper (1900) he also figured several of the larval forms.

The animals live in crevices of the coral rocks, protruding the anterior ends for feeding, but the remainder of the body is never exposed to the open water except at the breeding season. On the approach of the breeding season the body becomes much distended with eggs or sperm and assumes the characteristic color. (See above.) At this time it is extremely sensitive to contact, so that while it is comparatively easy to get good specimens of immature forms, mature ones, on being taken from the rock and on the first contact with sea-water or preserving fluid, begin active writhing movements which are usually strong enough to break the body in pieces, the sexual ends often going through movements quite like those of the normal swarming.

That *L. fucata* swarms at the breeding season was discovered by Mayer (1900), though he was in error in the identification of the species. This error is repeated by McIntosh (1910, p. 352), who, overlooking Mayer's correction, speaks of a swarming *Staurocephalus*. Later (1902), Mayer gave the correct identification and named the animal the Atlantic palolo because of the similarity of the swarming habit to that of a related species, *Leodice viridis*, of the Pacific. On the night or nights of the swarm the animals protrude the posterior ends of the bodies from the rocks and, by an anti-clockwise movement, break them off at the junction between the sexual and non-sexual portion. The sexual portion swims rapidly to the surface, usually reaching there about daylight. In an ordinary swarm the number of these ends to be seen floating in this way at daybreak is very large, there being hardly a square foot of the surface in which one is not to be seen. Just at sunrise the thin body-wall bursts, setting free the eggs and spermatozoa, and the eggs are at once fertilized. The eggs are large and float at the surface, where they undergo their early development. According to Mayer (1900, p. 7), they settle to the bottom on about the fifteenth day after fertilization, but for some days previous to this specimens in an aquarium could be seen in water of all depths.

This swarming usually occurs in coincidence with the last quarter of the June–July moon, though if the last quarter of this moon comes late in July, there may be a swarm in connection with the first as well as with the last quarter (Mayer, 1908, p. 108). In addition to the main swarm, there may be a smaller one on either the day before or the day after the principal one. As a footnote to a report by Treadwell (1914, p. 221), Mayer published the following table showing the recorded dates from 1898 to 1914:

Dates on which the Atlantic palolo has been observed to swarm at Tortugas and dates of the quarters of the moon.

The date of the principal swarm is shown in *italics*, while the dates upon which only a few worms are observed swarming are shown in ordinary type.

Year.	Dates upon which the palolo swarmed.	Dates of moon's quarters.	Year.	Dates upon which the palolo swarmed.	Dates of moon's quarters.
1898	July *9*, 10.....	Last quarter, July 10.	1907	July *2*, *3*.....	Last quarter, July 2.
1899	*1*, 2.....	Last quarter, June 29.	1908	*10*, 19.....	First quarter, July 6.
1900	*19*.....	Last quarter, July 18.			Last quarter, July 19.
1902	24, *25*, 28..	Last quarter, July 27.	1909	*6*, 7.....	Last quarter, July 10.
1903	*17*.....	Last quarter, July 17.	1910	June *29*, *30*.....	Last quarter, June 29.
1905	9, 10, 21,	First quarter, July 9.	1911	July *16*, *17*.....	Last quarter, July 18.
	22, 23, 24..	Last quarter, July 24.	1912	*6*, 7.....	Last quarter, July 7.
1906	*11*, *12*, 13..	Last quarter, July 13.	1914	*11*.....	Last quarter, July 14.

Treadwell (1915, p. 220) reported that the 1915 swarming occurred on the morning of July 1, the last quarter of the moon falling on the 3d; Mayer (1916, p. 178) recorded in 1916 an unusual swarm, in that while the larger swarm came on July 20, the day of the moon's last quarter, there was another but smaller one on the day of the full moon, July 14. To Dr. Mayer I am indebted for the information that in 1917 there was a dense swarm on the morning of July 8, with a smaller one on the 9th, the moon's last quarter falling on the 11th. The only certain record I have of a swarming of this species elsewhere is in a personal communication from Mr. Engelhardt, of the Museum of the Brooklyn Institute, who observed it at Andros Island in the Bahamas on June 12, 1914, the date of the moon's last quarter being June 15. Mr. Engelhardt collected some of the swimming ends, which I have identified as this species. It will be noticed that, while the time of swarming bears the same relation to the moon's phases in the Bahamas as it does in the Tortugas, it occurred in 1914 on a different month in the two localities.

In 1921 the last quarter of the June moon was on June 28. On June 29 I found sexually mature individuals in Montego Bay, Jamaica, but on the following mornings was unable to discover any swarming. Early in the following week a native fisherman told me that worms swim at the surface but only at very rare intervals, that they appear "early in the morning and as the sun gets hot they fade away," and that the last swarming he had known was "last week." Specimens which I collected at this time had lost their posterior ends. This seems to justify the inference that probably they swarm in Jamaica at the same time as in the Dry Tortugas.

That the Pacific palolo, *Leodice viridis*, swarms in a definite relation to the moon's phases in October and November has long been known, and considerable literature has appeared in this connection. Later, similar swarmings have been described in species of the Nereidæ by Izuka (1903), Hempelmann (1911), and Lillie and Just (1913), and in the Syllidæ by Galloway and Welch (1911), these agreeing with the Leodicidæ in occurring in coincidence with certain phases of the moon, but differing from them in that, instead of being limited to once a year, they may occur on several months in succession. That this rhythm has been set up in the race as a consequence of a long-continued tidal or light stimulus operating in a rhythmical manner is possible. Experiments recorded by Mayer (1908, p. 110, and 1909, p. 3) and Treadwell (1909, p. 139) showed that keeping the animals in a floating light-proof live-car where tidal and light stimuli were absent did not prevent the swarming at the regular time. The experiments were not, however, very conclusive, since it is not possible to keep the animals in a normal condition for more than a few days (Mayer kept them for 30) in such a live-car and it is hardly to be expected that if a rhythm had been fixed it would have been modified in so short a time. That an internal stimulus may also be at work was proved by Treadwell (1914, p. 222), who showed that there is a measurable increase in the elimination of CO_2 by the egg itself as it approaches maturity, indicating an increase in the rate of metabolism at this time, and this might, through increased elimination of waste products into the body-cavity, act as a stimulus to egg-laying. It seems to be evident that while more spectacular than the reproductive rhythms in other animals, this swarming is essentially similar in all cases and may be explained in the same way. Thus far no adequate explanation has appeared.

Leodice fucata has thus far been recorded from the Dry Tortugas, Porto Rico, Cape Florida, and the Bahamas. In the two former localities I found it the most abundant of the Leodicids living in the dead, porous coral rock below low-tide mark. I have no data on the greatest depth at which it occurs, my material having been collected only as far down as it was feasible to break off and carry home the large pieces of rock. Ehlers records it from 5 to 7 fathoms in Tortugas Channel. My Bahama record is based on the specimens of swarming ends sent me by Mr. Engelhardt; the U. S. National

Museum has a specimen from Nassau. I did not find it in Bermuda and there is no record of its occurrence there. I found a few in Tobago in 1918 and it was common in Montego Bay, Jamaica, in 1921. The U. S. National Museum has specimens from Cape Florida and from latitude N. 9° 32′, longitude W. 79° 54′ 30″, in 34 fathoms.

Leodice caribœa Grube.

(Plate 4, figures 1 to 4; text-figures 136 to 143.)

Eunice caribœa Grube, 1856, p. 57.
Eunice siciliensis Treadwell, 1901, p. 196.

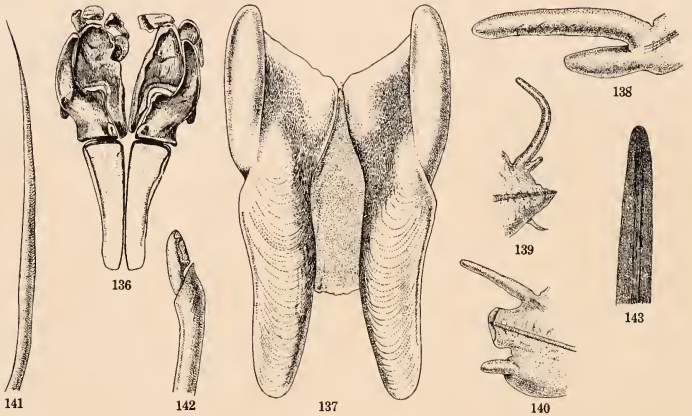
A species recognizable by the relatively enormous development of the mandibles as compared with the maxillæ (compare text-figures 136 and 137) and by the very feeble development of gills.

The body of an adult is long, some that I collected containing over 700 somites. The anterior region of the body, as far back as approximately the fiftieth somite, is usually more or less flattened dorso-ventrally, being plane or even concave on the ventral surface; but behind this region it becomes rounder and more narrow. In removing animals from the coral rocks, one often finds this anterior flattened portion bent sharply on itself and wedged tightly in a rock crevice. The prostomium is large and usually bent ventrally, so as to form an angle of about 45° with the peristomium. It is a faint greenish yellow in color, and this is continued onto the surface of the peristomium. The yellow tint of the body is continued to about somite 80, and some 50 following somites are dark gray, due probably to the chlorogogue layer of the intestine. Behind this region the body is transparent in immature animals, but in sexually mature ones is colored by the sex products. In one specimen of 340 somites the transition to the chlorogogue region occurred between somite 90 and 100, and this gray region extended to somite 168. The first eggs appeared at somite 191, and these filled the body to about somite 270. Throughout this sexual region there is a prominent black spot in the midventral line in each somite, and some somites show a black spot at the base of each parapodium. Occasionally there will appear an individual in which this sexual region is as sharply defined as it is in *L. fucata* (see p. 43), and the animal looks as if it might swarm on the approach of sexual maturity. A similar condition was described by Moore (1909, p. 246), in a Pacific *Leodice* to which he gave the name *paloloides* because of this structural resemblance to a swarming palolo (see p. 43). A comparison of *caribœa* with *paloloides* shows that the two are distinct though closely related species, and it is possible that they really swarm, though no evidence in confirmation of this belief has yet been found.

The tentacles (plate 4, figure 2) are rather longer than in Grube's description, the inner laterals a little longer than the outer and a little shorter than the median. The peristomium (plate 4, figure 2) is as long as the three following somites, its width being nearly twice its length. The following somites are very convex dorsally and are broad in proportion to their length. To a certain extent this appearance is due to the stimulus of being handled. Median and posterior somites are nearly round in cross-section and much longer in proportion to their width. The anterior dorsal cirri (text-figure 138) are large, but toward the posterior end they become very small (text-figure 139). There are two pairs of small anal cirri of unequal size (plate 4, figure 4).

The gills are very inconspicuous, appearing as a single filament first in the region of somites 80 to 90 and occur for about 110 somites. In the living animals, when the gills are filled with blood they are easy to see, but in preserved material they are hard to find, and small members of the species are apt to be taken for *Nicidion*. Usually there is but one filament (text-figure 139), but occasionally there may be a second, and I found one individual in which a trifid gill appeared on somite 105.

The first parapodium (text-figure 138) has large cirri and a very small setal portion with a few aciculæ. The tenth (text-figure 140) has a much larger setal portion with distinct anterior and posterior lips and a large acicula, while the cirri are much smaller than in the first. Through the gilled region (text-figure 139) the parapodia have very small cirri and a conical posterior lip, from the apex of which protrude the acicula. In comparison with the dorsal cirrus the gill looks large, but when compared with the gills of other species it is very small.



TEXT-FIGURES 136 to 143. *Leodice caribæa* Grube.

136. Maxilla ×40.
137. Mandible ×40.
138. First parapodium ×11.
139. Middle parapodium ×40.
140. Tenth parapodium ×40.
141. Simple seta ×310.
142. Compound seta ×310.
143. Acicula ×310.

The simple setæ (text-figure 141) are slender and slightly broadened toward the tip with denticulations along the convex border. The compound setæ (text-figure 142) have rather large basal joints with denticulated ends, each terminal joint being small with apical and subapical teeth and a striated hood. I was unable to find any pectinate setæ. The acicula (text-figure 143) is yellowish brown in color, rounded and slightly darker at the apex.

In the maxilla (text-figure 136) the carrier is longer than the forceps, almost rectangular in outline, and light yellowish-brown in color. The forceps are darker than the carrier, their basal portion being more than half their length. The proximal plates have each 3 large teeth. On either side distal to these is a row of 3 plates whose appearance depends on their position. The median one in each row is thicker than the others and has the appearance of being rolled at the end. The others are flat plates, more or less joined together. Between the proximal plates is a thick plate occupying the position of the unpaired in other species. In the figure it is drawn as if about half covered by the large plate. None of these distal plates has teeth. The mandible (text-figure 137) is much larger than the maxilla. The figure is a dorsal view, the ventral surface

showing a broad white plate with only a slight notch in the middle line of the cutting-edge. The species may often be recognized by this mandible, which, when protruded, looks like a white linen cuff stuck into the mouth-opening.

I have identified this as Grube's species, though from his imperfect description it is not possible to be certain. Renewed examination of the specimen described as *E. siciliensis* by me in 1900 shows that this Porto Rico specimen is *caribæa*. Grube's specimen came from St. Croix, Christiansted. I found a few in Bermuda, and it is fairly common in Tobago in Montego Bay, Jamaica, and at the Dry Tortugas. In Tobago there were two varieties, one much larger than the other and of a pink color in the egg-bearing somites; the smaller variety was green where filled with eggs. I was, however, unable to determine any other differences in the details of jaw, parapodia, and setal structure.

L. caribæa occurs in the crevices of the worn coral rock, the anterior end usually bent and twisted in a most complex fashion through the spaces in the rock. This makes it a difficult form to collect without breaking.

Leodice culebra Treadwell.

(Plate 2, figures 13 to 16; text-figures 144 to 153.)

Eunice culebra Treadwell, 1901, p. 197, figure 37.

A small species, approximately 150 mm. in length and containing not more than 150 somites.

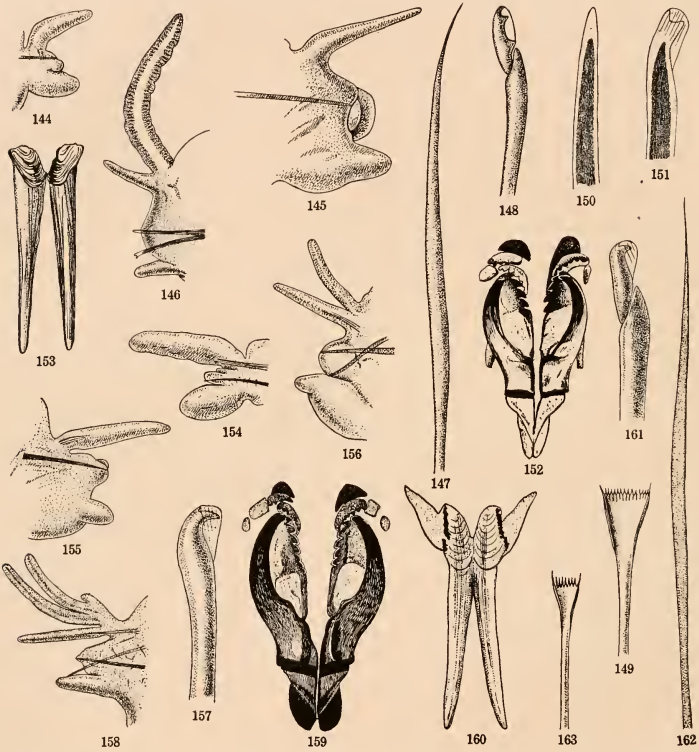
The anterior end of the body is colorless, except for the tint given it by the contained blood, and is very iridescent. The posterior two-thirds (plate 2, figure 13) is in life a noticeable green, which turns to a dark brown in alcohol.

The prostomium (plate 2, figure 14) is very noticeably four-lobed and is wider than the peristomium. The eyes are small but distinct. The tentacles are slender, not much tapered, the median reaching to the third somite. The inner lateral ones are a little shorter than the median and the outer lateral a little shorter than the inner. The peristomium (plate 2, figure 14) is nearly rectangular in outline, as long as the following three somites. The nuchal cirri are short, not reaching to the middle of the peristomium. There is very little tapering of the body toward the posterior end, what narrowing there is being confined to the extreme end. There is one pair of stout anal cirri (plate 2, figure 16).

The first parapodium (text-figure 144) has a very heavy ventral cirrus, the dorsal cirrus being about twice as long as the ventral and about half as thick. The setal portion has a ventro-posterior lobe, the acicula coming to the surface just dorsal to this. The tenth parapodium (text-figure 145) is very much larger than the first, the difference being mainly in the increase in size of the setigerous portion. The dorsal cirrus is slender and the ventral cirrus is a blunt cone carried on the end of a rounded pad. In a posterior parapodium (text-figure 146) the cirri are both very small, while the setal portion has a rounded posterior lip longer than the anterior. The gill-filament is larger than the dorsal cirrus. The gills are in the form of single filaments, but their distribution is very irregular. One individual had gills on somites 25 to 32 and no more until about somite 100, and from here they continued for about 50 somites. Others showed an arrangement much like this, but many gills had apparently been lost. In general, the gills are more regular in their distribution and more prominent in the posterior than in the anterior gill-bearing somites. The characteristic form is a single finger-shaped filament (text-figure 146), but in one case a single bifid gill was seen.

The simple seta (text-figure 147) is long, slightly enlarged, and bent at the apex without marginal winging. The compound setæ (text-figure 148) have fine denticula-

tions on the apices of the basal portions and small terminal portions with two subequal teeth. The pectinate setæ (text-figure 149) are rather broad at the apex with about 16



TEXT-FIGURES 144 to 153. *Leodice culebra* Treadwell.

144. First parapodium ×60.
145. Tenth parapodium ×60.
146. Posterior parapodium ×60.
147. Simple seta ×310.
148. Compound seta ×310.
149. Pectinate seta ×310.
150. Dorsal acicula ×310.
151. Ventral acicula ×310.
152. Maxilla ×32.
153. Mandible ×32.

TEXT-FIGURES 154 to 163. *Leodice tenuis* Treadwell.

154. First parapodium ×40.
155. Tenth parapodium ×40.
156. One-hundredth parapodium ×40.
157. Ventral acicula ×390.
158. Fiftieth parapodium in front of pygidium ×40.
159. Maxilla ×26.
160. Mandible ×28.
161. Compound seta ×390.
162. Simple seta ×247.
163. Pectinate seta ×390.

teeth. In the anterior somites there is a single acicula in each parapodium (text-figures 144 and 145), but posteriorly (text-figure 146) a second (ventral) one appears. In the anterior region the aciculæ are colorless, but posteriorly they become, except for the tip, more or less dark brown in color. The dorsal acicula (text-figure 150) has a blunt apex, while the ventral one is curved and bifid (text-figure 151). I could find no trace of needle aciculæ in the dorsal cirrus.

The maxilla (text-figure 152) is light brown in color, with more or less darker margins. The carrier is slender with narrow wings; the forceps is rather straight with dark bands along the inner edge of each basal part, on the concave face of the shaft and where the forceps joins the carrier. The proximal paired plates have 5 teeth on the right and 4 on the left; the distal paired plates have 6 on the right and 4 on the left; the unpaired plate has 7. The plates are light in color, but the toothed margins are dark. Crescent-shaped pigment patches occur distal to the plate. The mandible (text-figure 153) has very slender, widely separated shafts marked with longitudinal dark lines and with fine dark lines making concentric curves on the beveled portion.

L. culebra lives in crevices in the coral rock in close association with *Nicidion kinbergii*, which it closely resembles in form and appearance. Most of my specimens were collected at Marshall Island, Bermuda, in 1916, but a single one was dredged in the Northwest Channel at the Dry Tortugas in 1914, and I collected the species in Tobago in 1918. One specimen was taken at Ensenada Honda, Culebra, Porto Rico.

Leodice tenuis, new species.

(Plate 4, figure 11; text-figures 154 to 163.)

Only three specimens of this species were collected in the Tortugas, in 1909, 1913, and 1914, respectively. The first lacked only the anal cirri, the second was complete, and the last retained only the first 372 somites; of this last, a color drawing of the living animal was made (plate 4, figure 11). This specimen was found in loose rock near Loggerhead Key. The 1913 specimen was in a crevice in the coral rock inside a tube of white parchment-like material, evidently of its own manufacture. This was branched, with lateral branches ending blindly. The anterior end of the body is a light yellowish-red, owing much of its color to contained blood. Toward the middle the body is darker colored, on account of the color of the intestinal wall, but there is no surface pigment in any portion of the body. The 1913 specimen, which was entire, was 460 mm. long after preservation and was composed of over 500 somites. All color is lost in preserved material.

The prostomium is noticeably bilobed (plate 4, figure 11), shorter than the rather slender tentacles. Of these, the median is the longest, with successive diminution in length on the part of the inner and outer paired ones. The nuchal cirri are very slender and white, shorter than somite 1. The dorsal cirri are relatively rather prominent throughout the body. There are two pairs of anal cirri, both rather stout, one pair much longer than the other. The eyes are small but distinct.

The peristomium is as long as the three following somites, nearly rectangular in outline. The second somite is short; the following somites (in preserved material) about 0.5 mm. in length, while through the middle and posterior regions these reach a length of 1 mm.

The first parapodium (text-figure 154) has very prominent dorsal and ventral cirri; the post-setal lobe is longer than the anterior and a dark acicula extends into it; a tuft of needle aciculæ extends into the dorsal cirrus. The tenth parapodium (text-figure 155) has a relatively more slender but still prominent dorsal cirrus, while the ventral cirrus has decreased to a short lobe at the end of a prominent pad. The setal portion is about

as in the first, and the arrangement of aciculæ is much as it is in that somite. The one-hundredth parapodium (text-figure 156) has a rounded posterior lobe (which in the figure conceals the anterior one) and two aciculæ, the dorsal one being straight and simple at the end, while the ventral one is bifid at the end (text-figure 157). The ventral cirrus is still a small lobe at the end of a pad, while the dorsal is slender and straight, about as long as the slender gill which rises from its base. Text-figure 158 is the fiftieth parapodium from the posterior end, and shows that the setal portion becomes pointed, with a brown acicula extending into its apex, with a dorsal cirrus slightly more slender than anteriorly and a ventral cirrus slender and elongated. The gills in this somite are more prominent than the dorsal cirrus. Needle aciculæ extend into the dorsal cirrus in all somites, and in many, instead of a single ventral acicula, there are four or five in the setal lobe.

The gills begin at a point between the eightieth and ninetieth somites as a single filament. Later, other filaments are added (text-figures 156 and 158), but I have never found more than five on any gill. They are never very prominent, but extend to within a very few somites of the posterior end and retain the branched condition throughout. The blood-vessels form a loop in each filament.

The maxilla was dark in the specimen figured, though in another it was much lighter colored (text-figure 159). The carrier is relatively very short, with its winged margins rounded and very dark-colored. The forceps has long basal portions, the terminal portions slender and not much curved. The proximal plates have 7 teeth on the left and 5 on the right; the right distal paired plate has 6 teeth, the left has 1 large and 2 smaller ones; the unpaired has 7. There are two small flat plates on either side, and the usual crescent-shaped patches distally. The mandible is very delicate and difficult to remove without injury. Each half is slender, light-straw in color, with longitudinal markings of darker brown, and the terminal beveled portion is only faintly marked off from the basal. This terminal portion has very faint concentric lines not easily seen. There is a triangular wing on either side, with a band of irregular dark-brown spots marking the line of separation of the main portion and the wing (text-figure 160).

Anteriorly the compound setæ make up a dense tuft in each parapodium, the simple setæ being very inconspicuous. It is probable that pectinate setæ occur throughout the body, though I was unable to demonstrate them in all cases. Posteriorly these pectinate setæ are the most prominent of any, having very long shafts which extend far beyond the setal portion, while the other forms are very few in number and are often broken. The dorsal acicula (text-figures 154–158) is straight or slightly bent, bluntly rounded at the end, and varies in density of coloring in different parapodia. The ventral acicula (text-figure 157) is lighter in color, broadened and bent at the end, with a very small terminal and much larger subterminal tooth. The compound setæ have thick basal portions which are striated at the end (text-figure 161), and short and rather thick terminal joints, the latter with teeth much like those of the ventral acicula. These setæ are of essentially the same size as the acicula and in appearance differ from it mainly in the possession of the joint. The simple setæ (text-figure 162) are very long and slender, slightly widened and curved toward the end, but without wings or denticulations. The pectinate setæ (text-figure 163) are unusually small and in posterior somites are carried on a very long stalk. Each has 8 or 9 teeth.

Type in the American Museum of Natural History.

Leodice notata, new species.

(Plate 4, figure 12; text-figures 164 to 173.)

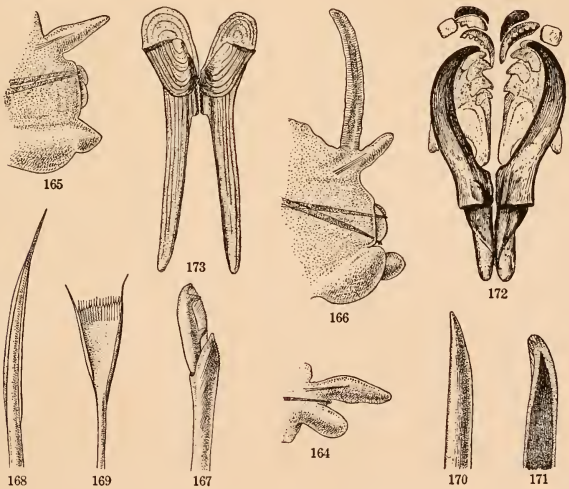
A rather small species, one specimen, not the largest of the collection, measured 40 mm. in length, with a prostomial width of less than 1 mm., and was composed of about

95 somites. It was collected on Buccoo Reef in Tobago in the same localities as *Nicidion kinbergii*, which it resembled in general appearance.

The prostomium is distinctly bilobed, with prominent eyes (plate 4, figure 12). Its dorsal surface is yellowish brown with a colorless patch on either side of the base of the median tentacle. This patch may be described as starting in three points from the posterior border of the prostomium. The median one surrounds the base of the median tentacle and broadens in front of it to meet the others on either side. The lateral patches also start from the posterior border, surround the eye and bases of inner and outer paired tentacles, and unite with the median one, so that the greater part of the dorsal surface is covered. The cirrophores are colored, but only in the larger specimens was any color present on the tentacle. The whole anterior region is yellowish brown with numerous white spots, this coloration being more intense toward the anterior end. Behind the region of somite 25 the color is gray, with a tendency toward a grouping in transverse bands. On the dorsal surface of somite 6 is an irregular patch of white, which may extend over onto somites 5 and 7.

The tentacles are rather short. The median, which is the longest, extends as far as the posterior border of the peristomium.

The peristomium is as long as the following three somites (plate 4, figure 12), the second somite about one-third as long as the first. There is little narrowing of the body until near the posterior end.



TEXT-FIGURES 164 to 173. *Leodice notata* Treadwell.

164. First parapodium ×50.
165. Tenth parapodium ×50.
166. Gilled parapodium ×50.
167. Compound seta ×380.
168. Simple seta ×380.
169. Pectinate seta ×380.
170. Dorsal acicula ×200.
171. Ventral acicula ×200.
172. Maxilla ×34.
173. Mandible ×34.

The first parapodium (text-figure 164) has a small setal lobe and large cirri, the dorsal asymmetrical lanceolate in form, the ventral rounded. A single acicula extends into the setal lobe and there are needle aciculæ in the dorsal cirrus. The tenth parapodium (text-figure 165) has a lanceolate dorsal cirrus and a short conical ventral one, carried on the end of a rounded swelling. The anterior lip is straight, the posterior rounded, with a rounded end to the setal lobe. There are two aciculæ in the setal portion and needle aciculæ in the dorsal cirrus. A parapodium, from posterior to the middle of the body (text-figure 166), has a very slender dorsal cirrus, smaller than the gill, while the ventral cirrus resembles that of the tenth. The anterior and posterior lips and setal lobe are much as in the tenth. There are needle aciculæ in the dorsal cirrus and a ventral hooked acicula (not represented) farther forward.

The nuchal cirri (plate 4, figure 12) are about half as long as the peristomium and, like all other cirri, are colorless. There is one pair of rather large anal cirri.

The compound seta (text-figure 167) has a basal portion expanded at the apex, its convex margin being much denticulated. The terminal joint is relatively rather small and is of the same size throughout the body, variations in length of the setæ being due to differences in the basal portion. The simple setæ (text-figure 168) vary somewhat in length, but all are curved gently toward the apex with a very narrow wing on either margin. The pectinate setæ (text-figure 169) have a narrow shaft, with about 20 very fine teeth, of which the terminal ones are the largest. The dorsal acicula (text-figure 170) is light brown and tapers to a blunt point. The ventral one (text-figure 171) is much darker, except at the extreme tip, and its apex is bifid rather than with an apical and subapical tooth. It has a very small hood.

The gills begin at about the sixteenth somite as a single filament, which is at first very short, but later becomes much longer (text-figure 166). In small individuals there is but one filament, but in larger ones there may be as many as three. They are absent from approximately the last 25 somites.

The maxilla (text-figure 172) is a dark sepia in color with, usually, the margins darker than the interior. The carrier is small and rather slender, the forceps rather heavy. Each proximal paired plate has 4 teeth, the unpaired has 5, the right paired has 6, the left paired has 2 large and 1 small one. The accessory plates are nearly square and there are pigment patches distal to the plates. The mandibles have slender shafts which are widely separated, the beveled portion with concentric lines which are darkest at their ends. Each has a colorless expansion on its anterior border (text-figure 173).

Type in the American Museum of Natural History.

Leodice bucciensis, new species.

(Text-figures 174 to 183.)

A single broken specimen collected at Buccoo Reef in Tobago in March 1918. No others appeared in later collections from this locality, and no drawings of the living animal were made. It seems best, however, to describe this individual and to give it provisionally the above specific name.

The animal was in three pieces, together measuring about 70 mm. in length, with a prostomial width of about 2 mm. and approximately 235 somites in the body. The prostomium is a little wider than the peristomium and is deeply incised. The dorsal surface is a reddish brown with numerous yellow spots and is very iridescent. The tentacles have a short basal ring which is greenish, but their greater part is colorless. This color is continued onto the whole anterior region of the body, but gradually lightens, the posterior region having a distinct yellowish tint.

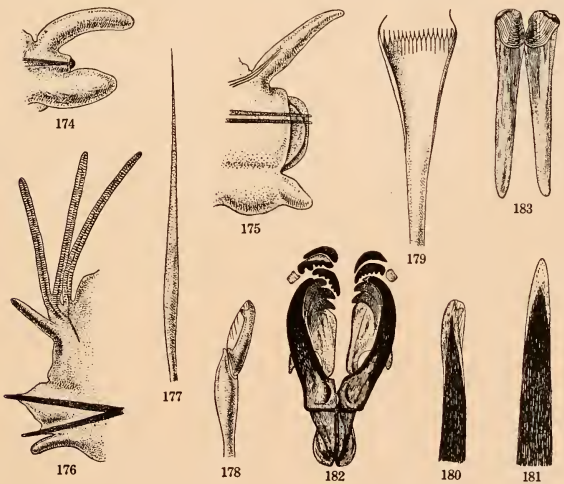
The peristomium is a little longer than broad, as long as the following three somites. The body reaches its greatest width at about the fifteenth somite and slowly narrows

posteriorly from there. The animal appeared to be regenerating a posterior end, for the last somite has a parapodium on one side and a very short pygidium with two short anal cirri on the other. All dorsal cirri are colorless.

The first parapodium (text-figure 174) has a long, cylindrical dorsal cirrus and a large, bluntly oval ventral one. There is a small post-setal lip, and two aciculæ extend to the surface. The tenth (text-figure 175) has a much greater height than the first, with a long, slender dorsal cirrus, the ventral one conical at the end of a swelling. The setal lobe is rounded at the apex, with vertical anterior and rounded posterior lips and two aciculæ. A gill-bearing parapodium (text-figure 176) has very slender cirri with the gills arising from a broad base just dorsal to the dorsal cirrus. The setal lobe is pointed and the acicula extends into it. A ventral acicula protrudes to the surface ventral to the setal lobe. There are needle aciculæ in all dorsal cirri.

The gills begin on the right side on somite 20 and on the left side of somite 21, the former with two filaments and the latter with one. The filaments are long, those of opposite sides being capable of meeting across the dorsal surface. The anterior gills have usually only two filaments, but in the region of somite 100 another is added, and three is the characteristic number throughout the remainder of the body. So far as I could determine, they continued to the very end, though the posterior ones were shriveled and difficult to see.

The simple setæ (text-figure 177) are small, with an asymmetrical swelling toward the end and no lateral wing. The compound ones (text-figure 178) have rather heavy



TEXT-FIGURES 174 to 183. *Leodice bucciensis* Treadwell.

174. First parapodium ×40.
175. Tenth parapodium ×34.
176. Gilled parapodium ×34.
177. Simple seta ×50.
178. Compound seta ×80.
179. Pectinate seta ×380.
180. Dorsal acicula ×200.
181. Ventral acicula ×200.
182. Maxilla ×24.
183. Mandible ×24.

basal joints, the terminal joints rather small, with apical and subapical teeth covered by a hood with smooth margins. The pectinate setæ (text-figure 179) are relatively large, with about twenty teeth, of which the terminal ones are largest. A dorsal acicula from a gilled somite (text-figure 181) has a blunt apex and is dark-colored until at the very apex. The hooded ventral acicula (text-figure 180) is smaller than the dorsal and is colored like it, but has a subapical tooth and a hood.

The maxilla (text-figure 182) has a small carrier, the forceps long and not much curved. The proximal paired plates have each 3 large teeth, the unpaired has 6, the right distal paired has 6, the left has two large and 2 small ones. The proximal paired plates are lighter in color than the distal ones or the forceps. There are small accessory plates at the sides, and crescentic colored patches distal to the plates. The mandible (text-figure 183) is small, with slender halves united only at a point. The general color is brown, but the halves are darker at the distal end, especially at the ends of the concentric lines.

Type in the American Museum of Natural History.

Genus MARPHYSA Savigny.

J. C. Savigny, Système des Annélides, 1820, p. 13.

Prostomium lobed, with five tentacles and with or without eyes. No nuchal cirri. Parapodia begin on the third body somite and gills occur attached to the dorsal cirri of a greater or lesser number of parapodia. The jaw apparatus, like that of *Leodice*, is composed of a maxilla and a mandible, the former of forceps plates supported on a carrier, together with two sets of paired and one unpaired plate and smaller accessory plates. The mandible is of two parts, united anteriorly and has a beveled cutting-edge. The terminal joint of the compound seta is often long and acute with entire edges.

Grube (1851, p. 44) lists these simply as *Eunice* without tentacular cirri, and this usage is followed in his later work (1856, p. 60), though he gives Savigny's division "Leodicæ Marphysæ" in parenthesis; Schmarda (1861) did not differentiate between *Eunice* and *Marphysa;* Quatrefages (1865*a*, p. 331) was the first to separate the two as distinct genera. Kinberg (1864, p. 561) divided *Marphysa* into *Nauphanta* and *Nausicaa*, depending on the form of the gills, but neither genus is now recognized.

Marphysa acicularum Webster.

(Plate 5, figures 1 to 4; text-figures 184 to 193.)

Marphysa acicularum Webster, 1884, p. 319, plate 10, figures 50–53.
Marphysa parishii Ehlers, 1887, p. 97.

A rather large species, over 200 mm. in length and with more than 300 somites.

A Tortugas specimen has the prostomium a yellowish brown except at the base of the tentacles, where there is a colorless patch. The ceratophores are colored like the head, but the terminal portions of the tentacles are much lighter, becoming colorless at the apices (plate 5, figure 2). This dorsal coloration at the head gradually shades at the sides into a colorless lower surface. The peristomium is dark-brown with numerous yellowish spots on the surface, and very iridescent. This dark color is continued onto the following regions, the first six somites being noticeably the darkest portions of the body. Behind the sixth somite the color gradually fades until at about the point of maximum width it passes into a yellowish-gray, which is continued throughout the body. On each somite, immediately following the head, there are yellowish-brown spots, showing a tendency to arrange themselves in median transverse bands. On the ventral surface a faint brownish coloration extends back to about the thirtieth somite and behind this the ventral surface is colored like the dorsal. Specimens collected in Bermuda had much less pigmentation than is described above, the body tint being almost entirely due to the blood in the vessels of the body wall and to the gills, though there was always a good deal of iridescence. The posterior region is usually very transparent, so that the intestinal contents can be seen through the body-wall.

The prostomium (plate 5, figures 1 and 2) is noticeably bilobed as seen from above, but four-lobed when viewed from below. The peristomium is nearly rectangular in outline, narrower than the prostomium and three times as long as the second somite. The following somites are about equal in length to the second, but there is a gradual increase in width up to a maximum between somites 30 and 40, with a gradual decrease toward the posterior end.

The tentacles (plate 5, figures 1 and 2) are about twice as long as the prostomium and show the usual gradation in length from the median outward. The dorsal cirri are never very large and throughout most of the body are rather small. There is one pair of long and a second much shorter pair of anal cirri (plate 5, figure 4).

Webster stated that the gills begin on somites 25 to 29. One Tortugas specimen showed them beginning on somite 25 with a single filament, while in another they began

on somite 27 with a single filament on the left side and two filaments on the right. The largest number of filaments that I could determine was five. They continue to practically the extreme posterior end of the body, only ten somites in one specimen being free from them. Since the last somites are always very small and much crowded together, this is practically at the end of the body. The number of filaments decreases posteriorly, but they remain bifid to within thirty somites from the end. The gills are slender (plate 5, figures 1 and 3) and may meet over the dorsal surface of the body. A great part of the general appearance of the animal is due to their color.

The first parapodium (text-figure 184) has a lanceolate dorsal cirrus and an elongate oval ventral one. The setal portion is rather large relatively to the cirri and carries a cirrus-like posterior lip. There is a single acicula. The tenth parapodium (text-figure 185) has a dorsal cirrus much like that of the first, while the ventral cirrus is thick and fleshy and is carried on the end of a ventral pad-like swelling. The setal portion is large and has an asymmetrical posterior lip, its apex directed upward. There are four or five dark aciculæ. In the one-hundredth parapodium (text-figure 186) the dorsal cirrus is very small, arising at the base of the gill, and the ventral cirrus is much smaller than anteriorly, though retaining in a general way its form. The setal portion is conical, with the posterior lip forming the apex of the cone and with dorsal and ventral aciculæ. I could find no needle aciculæ in the dorsal cirrus in any appendage. In the parapodium drawn there was a minutely denticulated ventral acicula (text-figure 187), but I could not find it in other parapodia; there is evidently variation in this particular. The appearance of the dorsal aciculæ varies considerably, some being almost colorless and others, corresponding in position to these in other somites, being a very dark brown.

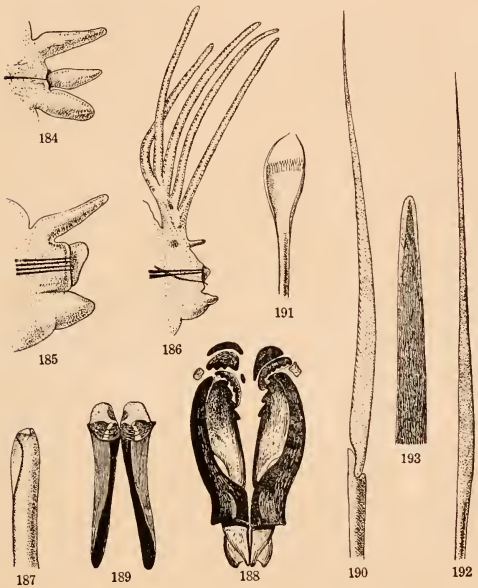
The maxilla (text-figure 188) has a very short carrier with small wings, the basal portion of the forceps short and thick, the terminal halves not very much tapered, all very dark. The proximal plates have 4 prominent teeth on either side and are dark along their edges but lighter farther back. The distal paired plates have 6 teeth on the right and 3 on the left, while the unpaired has 5. All of these plates are dark-colored. There are two crescent-shaped pigment patches, the larger being on the right; also a small light-colored pigment patch lateral to either paired plate, and a dark one lying median to the unpaired. The mandible (text-figure 189) is rather small, its shafts nearly of uniform width, light brown externally, but very dark on the median line, the beveled portion very dark except for a central brown line and with a white "wing" extending anteriorly from each half. On the median edge each wing has a light-brown patch. This mandible is quite characteristic and affords an easy method of distinguishing this species from the variety *brevibranchiata*.

The compound seta (text-figure 190) has a basal joint only slightly widened at the end and obscurely striated, with a long slender terminal joint. A marginal serrated wing appeared in most cases, though it was not possible to demonstrate it in all. The pectinate setæ (text-figure 191) are characterized by the large number of teeth and by the long terminal teeth which may bend around so as to be in contact. These setæ are not evident in the anterior somites, but become larger and with much longer stalks posteriorly. The simple setæ are long and slender, curved toward the apex, and sometimes with a narrow wing along the convex edge (text-figure 192).

The dorsal aciculæ (text-figure 193) are straight, with bluntly rounded ends. There is much variation in color, some being nearly colorless and others very dark. The one figured was light-colored for a very short distance; throughout the middle it was very dark, lightening again at the base.

M. acicularum was first described by Webster from specimens collected in Bermuda by G. Brown Goode. I found it very common in Bermuda between tides on muddy flats, such as occur in the upper end of Flatts Inlet or in Fairyland Creek. Some were

collected in loose coquina rock near Gibbet Island. They were also collected in Tuckerstown Bay and in Ely's Harbor. In the Tortugas two specimens were collected in much-worn coral rock lying between tides at the steamer landing at Fort Jefferson. The species also occurred in Buccoo Bay, Tobago. Verrill speaks of *Marphysa regalis* as the commonest species in Bermuda. In my 1916 collections these were almost as abundant, though found in slightly different localities. They are closely associated with the variety *brevibranchiata* Treadwell.



TEXT-FIGURES 184 to 193.
Marphysa acicularum Webster.
184. First parapodium ×20.
185. Tenth parapodium ×15.
186. One-hundredth parapodium ×16.
187. Tip of ventral acicula ×394.
188. Maxilla ×12.
189. Mandible ×12.
190. Compound seta ×394.
191. Pectinate seta ×394.
192. Simple seta ×394.
193. Dorsal acicula ×394.

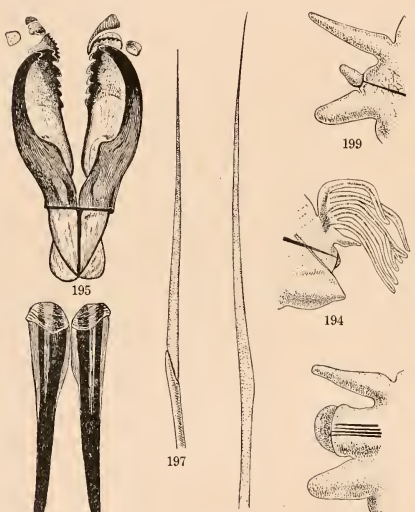
Ehlers (1887, p. 97) lists without further description a badly preserved specimen of *Marphysa* from Key West as probably *M. parishii* of Baird (1870, p. 352). Baird's description states that it is about 32 inches long, with articulated tentacles which are scarcely as long as the head (prostomium). In the Museum of Comparative Zoölogy at Cambridge is a specimen, apparently the one Ehlers saw, but it has longer, non-articulated tentacles, and it seems to me to agree in all essential details with *M. acicularum*. So far as I can tell, it is of this species, and *M. parishii* has not been described from the Florida region.

Marphysa acicularum Webster, var. brevibranchiata, new variety.

(Plate 5, figures 5 to 8; text-figures 194 to 200.)

At Flatts Inlet, Ely's Harbor, and Fairyland Creek, Bermuda, I found associated with *Marphysa acicularum* a second form which, while agreeing with *acicularum* in general, differs from it in the form of the jaw and gills. In some animals these might be merely sex differences, but, so far as I know, sex differences do not occur in this genus. Since the animals were not breeding at the time of my visit to Bermuda, I was unable to determine this point, but believe that the differences are of a varietal character.

The general appearance of the body (plate 5, figure 5) is very like that of *M. acicularum*, but the prostomium is more evidently bilobed and there is a greenish tint on the anterior region which does not appear on *acicularum*. The tentacles are relatively longer and the gills are much shorter and thicker. The general form of the body is very similar in the two.



TEXT-FIGURES 194 to 200.
Marphysa acicularum Webster, var. *brevibranchiata* Treadwell.

194. One-hundredth parapodium ×14.
195. Maxilla ×14.
196. Mandible ×14.
197. Compound seta ×394.
198. Simple seta ×394.
199. First parapodium ×30.
200. Tenth parapodium ×24.

The first parapodium has rather more slender cirri than in *M. acicularum* (text-figure 199). The tenth parapodium shows in the variety a longer and more slender ventral cirrus than occurs in the species (text-figure 200), and the middle parapodia of the species have a much more slender dorsal cirrus than has the variety. The anal cirri are not noticeably different in the two. (Compare figure 4 with 8 on plate 5.)

The gills begin in the region of somite 28, as in *acicularum*, but are always shorter and with more branches than in the species. While I have never found more than

five branches in the gills of *M. acicularum*, and these are long and slender, arising from a rapidly diminishing base (text-figure 186), those of the variety (text-figure 194) are shorter, arise from the side of a base of nearly uniform diameter, and may have as many as eight branches. They extend farther posteriorly than in *M. acicularum* (compare figure 5 with 1, plate 5) and retain their branched condition to a much later somite. From the surface of the body this gill difference is the most convenient method of distinguishing the species from the variety.

The maxilla (text-figure 195) has a rather large carrier. In the forceps the basal portion extends for nearly one-half its length, the terminal portions are slender and much curved. The carrier is dark brown with black margins, while the forceps is nearly black. Each proximal maxillary plate has 6 prominent teeth, the distal plates being rather small, with 9 teeth on the right and 3 on the left. The unpaired plate has 8 teeth. The terminal pigment patch on the right is larger than that on the left, and there are two small, non-pigmented chitinous plates, one on either side of the terminal paired. The mandible (text-figure 196) is very dark-colored with longitudinal patches of a lighter brown toward the anterior end, the beveled portion marked with concentric black lines and washed with white. The distinction between this jaw apparatus and that of *M. acicularum* can be easily seen by comparing figures 188 and 189 with 195 and 196. By bending back the lower lip the mandibles can be exposed and the species be distinguished from the variety by the characteristic structure of their anterior ends.

The setæ are very similar to those of the species, though more slender. (Compare figure 197 with figure 190 for the compound setæ, and figures 198 and 192 for the simple ones.) In the variety the pectinate setæ of the anterior somites are very like those of the species but have fewer teeth, while in the posterior somites they become broader, the teeth are much larger, and the terminal teeth are relatively shorter. A similar but less noticeable change occurs in the pectinate setæ of the species.

The aciculæ are similar to the dorsal ones in the species, there being no bifid ones in the ventral bundle.

Marphysa belli Audouin et Milne Edwards, var. oculata, new variety.

(Plate 5, figures 13 and 14; text-figures 201 to 211.)

Bibliography for *Marphysa belli*.

Eunice belli Audouin et Milne Edwards, 1834, p. 149, plate III, figures 1 to 4, 8, 9.
Marphysa belli Quatrefages, 1865*a*, volume 1, p. 333.
Marphysa belli v. Marenzeller, 1874, p. 59.
Marphysa belli Ehlers, 1887, p. 95, plate 28, figures 1–8.
Marphysa belli de St. Joseph, 1888, p. 204.
Marphysa belli McIntosh, 1910, p. 448, plate LV, figures 5, 6; plate LX, figure 12; plate LXIII, figures 2, 2*a*; plate LXV, figures 11, 11*a*; plate LXXXVI, figures 3, 3*d*.

A single incomplete specimen was collected at Mangrove Key in Key West Harbor in June 1915. The body retained approximately 100 somites, was about 70 mm. long, with a peristomial width of 1.5 mm.

There was no definite pigmentation, though the anterior part of the body is darker than the posterior and there was a marked iridescence (plate 5, figure 13). The prostomium is rounded, with a very faint indication of a median fissure. The tentacles are pointed, extending beyond the prostomium, the median and the inner paired about equal in length, the outer paired shorter. In the preserving fluid the tentacles contracted so as to be shorter than the prostomium. There is one pair of prominent eyes.

The peristomium (plate 5, figure 13) is about as long as the prostomium, and not more than one-third longer than somite 2. Behind this point the body gradually widens to about the fifteenth somite, where it is approximately 2 mm. broad, and this diameter

is retained through the greater part of the remainder of the body, though it gradually narrows toward the posterior end. The gills furnish a marked patch of color on somites 10 to 22 (plate 5, figure 13).

The first parapodium (text-figure 201) is not more than half as long as the tenth, with a prominent post-setal lobe, in form much like the dorsal and ventral cirri. The dorsal cirrus is more slender than the ventral and is not so closely joined to the post-setal lobe. Two or three aciculæ extend into the setal portion and it carries a dense tuft of setæ of the usual three kinds.

The tenth parapodium (text-figure 202) has a prominent pointed posterior lobe and a rounded anterior one. The dorsal cirrus is slender and extends beyond the setal lobe for one-third of its length. The ventral cirrus has a heavy base, abruptly rounding to a cirrus-like end. Needle aciculæ extend into the dorsal cirrus, and two or more aciculæ occur in the setal lobe. A later parapodium (text-figure 203), taken between the fortieth and the fiftieth, shows a long, slender dorsal cirrus and a much heavier short, rounded ventral one. This specimen proved to be badly preserved and was somewhat shriveled, so that the proportions in the drawing may not be quite characteristic. There is a pointed posterior lip with a large acicula extending beyond its apex. Ventrally there is a second (hooked) acicula.

The gills are limited to somites 10 to 22 and are unusual in that instead of beginning and ending with a few filaments, the first and the last have, respectively, 10 and 11. This number is exceeded in the median gills. They are very long and meet over the back (plate 5, figures 13 and 14; text-figure 202).

The compound setæ of the anterior somites are slender, with slender, curved terminal portions which are not toothed (text-figure 204). Farther back they are replaced by setæ having a similar form, but much longer terminal joints, and in the posterior end of the body the only compound setæ are of the form shown in text-figure 205. These have slender basal joints with denticulated hood covering the terminal joints, the latter with terminal and subterminal teeth. In the dorsal part of the seta tuft are very long, slender, simple setæ (text-figure 206), while ventral to them are others of about the same length but slightly broadened toward the end. This broadened portion narrows again at the apex of the seta and is very faintly striated along one margin. The pectinate setæ (text-figure 207) have very few teeth and are not very concave. Some have more teeth than in the one figured, but the number is never great. The dorsal aciculæ (text-figure 208) are straight with a simple end and only faintly colored. The ventral aciculæ (text-figure 209) are similar to these in general appearance, but are bifid at the end and have a terminal hood.

None of the published figures of *M. belli* gives the posterior end of the animal, and only McIntosh mentions the "slender tail" (1910, p. 449). The Key West specimen lacked the posterior end. Specimens of *M. belli* from Plymouth, England, showed the posterior dorsal cirri to be very long and slender and one pair of rather short (relative to the dorsal cirri) anal cirri.

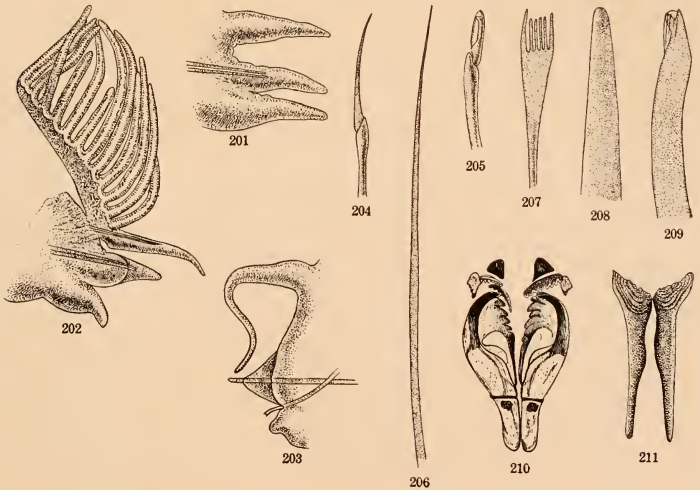
The maxilla is light brown by transmitted light (text-figure 210). The carrier is almost rectangular in form with a dark spot on either side near the distal end. The forceps is slender, its halves noticeably curved. The proximal paired plates are colored like the forceps, with 5 teeth on the left and 7 on the right. The left distal paired plate has 3 large and 3 small teeth and the right has 8. The unpaired plate has 6. There are crescent patches distal to the plates and small plates outside the distal paired. The mandible (text-figure 211) is slender, its inner margins dark brown, its outer margins almost colorless. The beveled portion is delicate and prolonged laterally into a prominent tooth-like plate, which is prolonged into a thin chitinous plate not shown in the figure.

Ehlers (1887) described a single specimen collected at 321 fathoms in latitude 28° 42″ N., longitude 38° 40″ W. While his figure would indicate that his specimen was much contracted, it seems to have been about the size of the one I found at Key West and to agree with it in most respects, though he stated that it is without eyes. He figured the ventral acicula as smooth, while in mine it was bifid. He described a posterior three-pointed lip in the anterior parapodia, which does not appear in his figures, and he probably referred to the two cirri and the post-setal lobe, which together give the three-lobed appearance (text-figure 201).

Specimens from Trieste, under stones on the southern coast of the Bay of Muggia, were described by v. Marenzeller (1874). In size and in number and arrangement of gills these agree with the Key West specimen. There were some differences in the number of the teeth on the paired plates, but these differences I consider unimportant.

Audouin and Milne Edwards (1834) figure the anterior region of the body and parapodia, but not the jaws. Their figures and descriptions are not different from the above of the Florida specimen. Quatrefages (1865*a*) gives no figures, but his diagnosis of the species shows no differences except in the position of the gills and the number of their filaments, which are evidently matters of individual variation.

McIntosh (1910) described and figured the living animal as well as details of jaws and setæ. His specimen is figured without eyes, but this detail is not mentioned in the text.



TEXT-FIGURES 201 to 211. *Marphysa belli* Audouin et Milne Edwards, var. *oculata* Treadwell.

201. First parapodium ×60.
202. Tenth parapodium ×33.
203. Middle parapodium ×60.
204. Compound seta from first parapodium ×394.
205. Compound seta ×394.
206. Simple seta ×394.
207. Pectinate seta from middle of body ×394.
208. Dorsal acicula ×394.
209. Ventral acicula ×394.
210. Maxilla ×20.
211. Mandible ×20.

According to his figures, the head is much more of a sugar-loaf in form than is the case with my Key West specimen (plate LV, figure 5; plate LX, figure 12), and the tentacles are longer and more slender. As I have stated above, there is considerable variation in the form of the setæ, and apparently McIntosh has chosen to figure one form and I another, for I have seen and described (see above), but not figured, all of the forms he mentions except that I did not find any compound seta with as *long* a terminal joint as the one he gives in plate LXXXVI, figure 3*a*. He gives two sets of figures of the jaw, one on plate LXIII, figures 2 and 2*a*, and the other on plate LXV, figures 11 and 11*a*, and his text references are solely to the latter. Both maxillæ and mandibles are very unlike in his two sets of drawings, and while they may be intended to represent jaws from animals of different ages, that is nowhere stated. The maxilla of my Key West specimen agrees closely with the one McIntosh figures in plate LXIII, figure 2, except that he represents an unsymmetrical arrangement of the teeth in the left proximal plate which did not appear in my material. The angle between the halves of the mandible is less in his figure (plate LXIII, figure 2*a*) than in mine, but these differences seem not of specific importance. He describes the gills as beginning on the fourteenth parapodium and states that there are 20 to 25 pairs. These again seem to be matters of individual variation.

I have also compared the Florida specimen with some purchased from the Marine Biological Laboratory at Plymouth, England. In these, the gills began on the seventeenth setigerous somite and extended through 25 somites. The gills had more filaments than the Key West specimen, and the jaws were larger and with more teeth on the plates. As the Plymouth specimens were much larger than was the one from Florida, these are evidently matters dependent on age and not specific in character.

In all of the figures I have seen of this species it is represented as without eyes, and, as stated above, Ehlers definitely gives this as one of the characteristics of his Florida specimen. I have examined Ehlers's specimen in the Museum of Comparative Zoölogy at Cambridge with reference to this point, but find that it has been dried and that it is not possible to see whether eyes are present or not. In the rest of the literature I find no reference to eyes, but I can find no indication of these organs in the Plymouth specimens. Since the presence or absence of eyes does not in itself seem to me of specific importance, I have regarded this as merely a varietal difference.

Marphysa viridis Treadwell.

(Plate 6, figures 1 to 4; text-figures 212 to 223.)

Marphysa viridis Treadwell, 1917, p. 264, plate 2, figures 13–18; plate 3, figures 1 and 2.

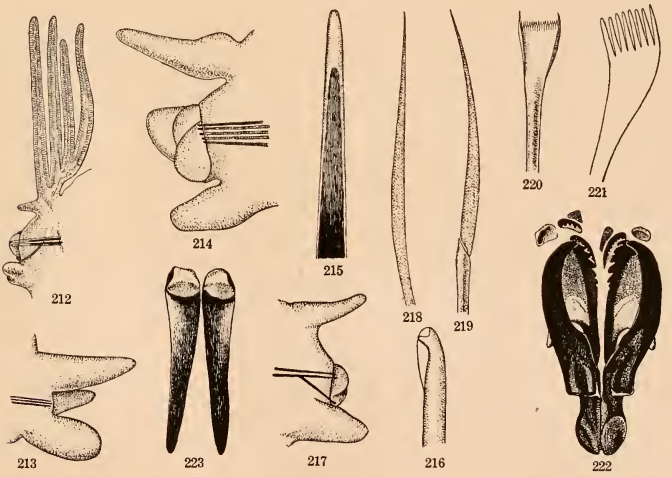
A rather small species of this genus, the type specimen, after preservation, and much contracted, measured 100 mm. in length, 2.5 mm. wide at the peristomium; it contains about 200 somites. In life, the prostomium and first somite are of a decidedly greenish tint (not adequately shown by the artist in the figure) and very iridescent, while the remainder of the body is flesh-color, in places distinctly red because of the contained blood (plate 6, figures 1–4). There are numerous yellow spots on the dorsal surface of the anterior somites. Preserved material shows a pronounced iridescence as far back as the ninth somite, while the remainder of the body is uniform grayish brown.

The prostomium is distinctly bilobed and the tentacles rather long, colorless, pointed at the apex, and extend as far back as the third somite (plate 6, figure 2). There are two pairs of anal cirri, one being much larger than the other (plate 6, figure 4).

The peristomium is about as long as the prostomium, a little wider on the posterior than on the anterior margin, and about twice as long as the second somite (plate 6, figure 2). The succeeding somites are practically uniform in width and length until they narrow toward the posterior end.

In the type specimen the gills begin on somite 25 with a double filament, while they appear as a single filament on the left of somite 24, becoming double in 25. The number of filaments is very irregular; on the right side of the type, for example, somites 25 to 34 show 2, 1, 1, 2, 2, 2, 2, 2, 4, 2 filaments, respectively. Together with this irregular addition of filaments, there is an increase in length, though in the fully expanded animal the filaments do not meet over the mid-dorsal line (text-figure 212). The greatest number of filaments I could find in the type was five. Toward the posterior end the number of filaments becomes reduced to one again, but this is longer than in anterior somites. The last gill is on the twenty-fourth somite from the posterior end. On the base of the posterior gills there is a prominent pigment spot.

The first parapodium (text-figure 213) has the dorsal cirrus a little longer and more pointed than the ventral one and with a conical post-setal lobe; it bears several aciculæ. The tenth parapodium (text-figure 214) has a dorso-lateral post-setal lip; the setal lobe has two lips, one dorso-posterior and the other ventro-anterior. The dorsal cirrus has a constricted base, then widens abruptly, becoming narrow toward the tip. The ventral cirrus has a broad base of attachment and is bluntly rounded at the apex. There are 4 or 5 aciculæ in the setal portion, but I could find no needle aciculæ in the base of the dorsal cirrus. A parapodium from the middle of the body (text-figure 212) shows a rounded setal lobe whose anterior and posterior lips are about equal in length. The dorsal



TEXT-FIGURES 212 to 223. *Marphysa viridis* Treadwell.

212. Middle parapodium ×40.
213. First parapodium ×34.
214. Tenth parapodium ×34.
215. Dorsal acicula ×310.
216. Ventral acicula ×310.
217. Posterior parapodium ×40.
218. Simple seta ×310.
219. Compound seta ×310.
220. First kind of pectinate seta ×394.
221. Second kind of pectinate seta ×394.
222. Maxilla ×20.
223. Mandible ×20.

cirrus is very small and does not extend to the end of the setal lobe. The ventral cirrus has a broad base and a small, cylindrical terminal portion. The gills arise from rather a broad base. There are two dorsal aciculæ which have straight colorless ends, but are darker toward their bases (text-figure 215), and a more slender single ventral form (text-figure 216), with a bifid end covered by a hood, emerging to the surface just dorsal to the ventral cirrus. Behind the gill-bearing somites (text-figure 217) the dorsal and ventral cirri become more prominent, the former more slender than the latter. The anterior and posterior lips are of equal length, while the setal portion shows two rounded lobes as in more anterior somites. My original notes state that needle aciculæ extend into the dorsal cirrus, but I have not been able to demonstrate them in my preserved material. Either there is variability in this respect or my notes were incorrect.

The simple setæ (text-figure 218) are slender, swollen slightly toward the apex, and with entire edges. The compound setæ (text-figure 219) have marked serrations on the end of the basal portions, the terminal joints gently curved to acute apices, without teeth. The pectinate setæ of anterior somites (text-figure 220) have about 20 very fine teeth, the terminal ones being a little longer than the others. Toward the middle of the body a form with fewer and more prominent teeth makes its appearance, and posteriorly these are the only ones represented. An extreme form is shown in text-figure 221. This whole seta is much flatter than the ordinary kind, and has only 8 teeth. Intermediate forms occur between these two kinds.

The maxilla is very dark in color (text-figure 222). The carrier is rather small, the terminal halves of the forceps large relative to their base, curved through about 20°. The proximal paired plates have 6 teeth on the right and 5 on the left. The distal paired plates have 7 on the right and 4 on the left; the unpaired has 8. The mandible (text-figure 223) has slender dark shafts, the beveled portion is small, its surface covered with a white incrustation.

Collected in July 1915 at Mangrove Key in Key West Harbor, at Boca Grande, and in Marquesas Key, within digging distance of low-water mark, in sandy mud.

The type is in the American Museum of Natural History.

Marphysa regalis Verrill.

(Plate 5, figures 9 to 12; text-figures 224 to 234.)

Marphysa regalis Verrill, 1900, p. 636.
Marphysa fragilis Treadwell, 1911, pp. 2–5, figures 1–7.

Verrill's description, published without figures, gave a very brief account of the coloration, so that I did not recognize it when it appeared in my Tortugas collections, and described it as a new species. Two lots were collected in the Tortugas, both in soft coquina stone, one on either side of Loggerhead Key. A few were found in similar stone in Condado Bay, near San Juan, Porto Rico, in 1915, and one was taken by the American Museum party of that year 1.5 miles south of Cano Gorda Island, near Guanica Harbor, on the southern shore of Porto Rico. It was very abundant in my 1916 collections in Bermuda, occurring everywhere in soft rock, and a few were collected in Montego Bay, Jamaica.

There is a considerable amount of variation in the coloration of living specimens, though their general appearance is unmistakable. The anterior and ventral surfaces of the prostomium are white, while its dorsal surface, as far as the bases of the tentacles, is brown, with more or less white between the bases of the tentacles (plate 5, figure 10). There is a brown ring around the base of the unpaired and each inner paired tentacle. The eyes are small, of a deep purple color. The tentacles are mostly uncolored and have irregularly arranged brownish rings, but are not, so far as I can see, actually articulated, though Verrill described them as such.

In the Tortugas specimens the peristomium was brown (plate 5, figure 10) and densely covered with pearly white spots, not all of which are shown in the figure. The next three somites had each a pearly white spot in the mid-dorsal line, their dorso-lateral surfaces colored like the prostomium, but with fewer white spots. These median white areas appear more or less irregularly in later somites as far as the eleventh, and occur in every somite behind this to about the twenty-fifth, behind which the brownish color disappears, though the white spots continue. The middle and posterior regions often have a decidedly bluish tint (plate 5, figures 9 and 11).

Usually somites 10 and 11 are entirely white, but in one specimen from Porto Rico (plate 5, figure 9) this white color extends over somite 12 and is less marked on 10. At about the region of somite 50 the color largely disappears, leaving only a pearly luster to the skin and a mottling with white spots. The Tortugas specimens were less pigmented than were those from Porto Rico, as is indicated by a comparison of figures 9 and 10. In the Porto Rico specimens (plate 5, figure 9), there was on the ventral surface of about the last 40 somites a transverse brown band, which did not appear on individuals from other localities. The absolute size varies with the degree of expansion. One with a peristomium width of 3.5 mm. showed a slight narrowing in the following somites, but a later increase in width to 7 mm. at about somite 40. The anterior region, back to about somite 40, is noticeably convex on the dorsal surface, but behind this region the body is much flattened. The length may be as much as 150 mm., with about 200 somites. They are very easily broken in handling, and, from the fact that many are regenerating posterior ends when collected, it would seem as if they are frequently broken under their normal life conditions.

The prostomium (plate 5, figure 10) is bilobed, with a rather broad depression between the lobes. The tentacles extend to only a short distance beyond the prostomium, are approximately equal in size, and are irregularly banded with brown. The peristomium may be considerably longer than broad, or it may be so contracted, as in my original description (*loc. cit.*, fig. 1), as to have the transverse diameter much the greater. The later somites are quite similar in size, but behind somite 9 they become shorter.

The first parapodium (text-figure 224) has a narrow basal part, but abruptly widens just beyond this. The setal portion has a conical post-setal lip but no definite anterior one. The dorsal cirrus is large, sagittate in outline, while the ventral cirrus is much heavier and is attached to the parapodium for the greater part of its width. There is a single large acicula, but no needle aciculæ extend into the dorsal cirrus.

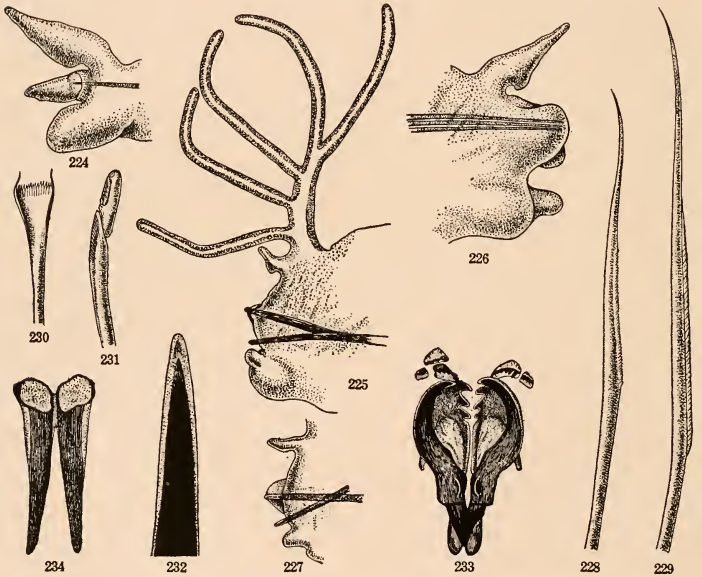
The ventral cirrus of the third parapodium (not somite, as stated in my original description, p. 3) shows a prominent, swollen basal portion, which reappears on later somites as far as somite 25, but behind this point it gradually disappears. The dorsal cirri, which anteriorly are prominent, become small later and in most of the body are very inconspicuous. (Compare text-figures 224 and 225.)

The tenth parapodium (text-figure 226) has a prominent post-setal lobe, rounded at the apex and bent slightly dorsally, the end of the setal lobe itself being bent ventrally. The dorsal cirrus has an asymmetrical sagittate outline, and is relatively much smaller than in the first parapodium. The ventral cirrus is small, arising from the end of a swollen, cushion-like base.

In later somites the post-setal lobe becomes smaller and, as shown in text-figure 225 (of the thirty-fifth parapodium), it is merely a pointed lobe extending only a short distance beyond the anterior lip. The dorsal and ventral cirri are smaller than anteriorly, but retain practically their earlier form. In parapodia from farther posteriorly (text-figure 227), both cirri are small, the ventral one loses its swollen base, and the conical post-setal lip again makes its appearance. There are two short, colorless anal cirri (plate 5, figure 12).

The posterior simple setæ have long shafts, are widened toward the end, and this widened portion is curved, denticulated along one edge, and tapered to an acute point (text-figure 228). In anterior somites (text-figure 229) the denticulations do not appear, but there is a narrow, obscurely striated fin. The pectinate setæ have about 20 teeth, the two terminal ones much longer than the others (text-figure 230). These reach their greatest development toward the posterior end, where they are arranged in bundles of 20 or more lying dorsal to the acicula and ventral to the post-setal lobe. The compound setæ (text-figure 231) have stalks of varying length, their apices slightly swollen and bent, the terminal joint with an apical and subapical tooth covered with the usual hood.

Throughout the greater part of the body the aciculæ (text-figures 225, 227) are dark-colored with lighter lateral margins, but anteriorly they are much lighter in color. They are rather large and in both the dorsal and ventral ones the end is entire and not toothed (text-figure 232).



TEXT-FIGURES 224 to 234. *Marphysa regalis* Verrill.

224. First parapodium ×30.
225. Thirty-fifth parapodium ×30.
226. Tenth parapodium ×30.
227. Parapodium from body behind gills ×30.
228. Posterior simple seta ×394.
229. Anterior simple seta ×394.
230. Pectinate seta ×394.
231. Compound seta ×394.
232. Acicula ×394.
233. Maxilla ×12.
234. Mandible ×12.

The maxilla is dark brown with the edges of the teeth more or less covered with a whitish incrustation.

The carrier (text-figure 233) is slender, the forceps heavy, each half with a white-tipped swelling at the base, and much curved. The proximal paired plates have 3 prominent teeth on either side, the distal paired with 4 on the left and 7 on the right. The unpaired plate has 6 teeth. A small plate with recurved edge lies lateral to each terminal paired plate. This figure was drawn from a Porto Rico specimen in which the number of teeth varied somewhat from those described from the Tortugas. The mandible has slender dark-brown limbs with a transparent lateral margin on either side. The terminal beveled portion is covered with a white incrustation, but has dark-brown margins (text-figure 234).

Marphysa brevitentaculata, new species.

(Plate 6, figures 13 and 14; text-figures 235 to 243.)

A moderately large species. The prostomium is 2 mm. in diameter and the body at its widest is as much as 4 mm. The type specimen, exclusive of the pygidial region, measured 600 mm. and contained about 800 somites.

There is little pigmentation on any part of the body, some specimens appearing colorless and others a faint slaty blue. A faint pink tint, due to blood, may appear on various parts of the body and the colors of the gills are noticeably bright (plate 6, figure 13).

The prostomium (plate 6, figure 14) is rounded, with a very minute median constriction, and in life is often expanded laterally so as to be wider than the first somite. There are five very short colorless tentacles, not more than half as long as the prostomium. Each has a fine longitudinal blood-vessel on its dorsal surface.

The first somite (plate 6, figures 13 and 14) is about as long as the three following ones. Later ones increase very gradually in length and breadth to about the middle of the body; at the posterior end the narrowing is rather abrupt, the pygidium being narrow. In life the pygidium is colored green. It carries two pairs of anal cirri, one pair much larger than the other.

The first parapodium (text-figure 235) has large dorsal and ventral cirri and a long cirrus-like posterior lobe. There is one dark-brown acicula. The tenth parapodium (text-figure 236) has conical dorsal and ventral cirri with, on the setal lobe, a high anterior lip and a large, conical posterior one. There are two dark aciculæ. The fiftieth parapodium (text-figure 237) has a pointed dorsal cirrus whose ventral surface is lobed and a conical ventral one. The posterior lip is rounded and extends from the surface farther than the apex of the setæ. There are two dark aciculæ in the setal portion and needle aciculæ in the dorsal cirrus. A parapodium from the region of the six-hundredth (text-figure 238) has smaller setal and posterior lobes than farther forward, also one brown acicula. No hooked ventral acicula was seen.

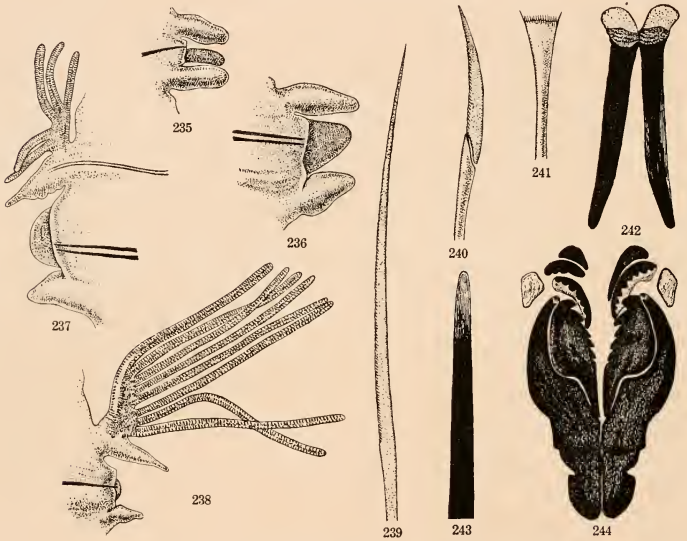
The setæ of the anterior region are of two forms, the simple ones (text-figure 239) long and slender, slightly widened toward the ends, the convex borders with fine denticulations, the compound ones (text-figure 240) with flattened terminal joints, curved to a sharp point. I could find no pectinate setæ in anterior somites, but in the region of the fiftieth were some very small and slender ones with about 16 very fine teeth (text-figure 241). The acicula (text-figure 243) is straight, dark-colored to very near the apex.

In the type specimen the gills begin as 2 filaments on the left side of somite 39 and on the right side of somite 37. There are some irregularities in the number of the filaments, but they very soon increase to as many as 5 and in later somites there are 8 (text-figure 238). They arise from a broad base which narrows rapidly toward the point of origin of the terminal filament.

The maxilla (text-figure 244) is very dark-colored, with short carriers and heavy forceps curved upward at the ends. The proximal paired plates have each 5 teeth, the unpaired has 6, the right distal paired has 9, the left has 3. There are dark pigment patches distal to the plates and lighter colored accessory plates on the sides. The mandible (text-figure 242) has very narrow shafts and a small beveled portion covered with a whitish incrustation, which is continued forward as a colorless plate.

The specimens of *M. brevitentaculata* were collected in sand on a beach near Scarborough, in Tobago, in April 1918. They seemed fairly common in the sand, but were extremely difficult to collect entire, apparently on account of the depth of the burrows and the rapidity with which they crawl head first down them.

Type in the American Museum of Natural History.



TEXT-FIGURES 235 to 244. *Marphysa brevitentaculata* Treadwell.

235. First parapodium ×55.
236. Tenth parapodium ×20.
237. Parapodium from region of the fiftieth ×34.
238. Parapodium from region of the six-hundredth ×34.
239. Simple seta ×380.
240. Compound seta from anterior end ×380.
241. Pectinate seta ×380.
242. Mandible ×20.
243. Acicula from sixtieth parapodium ×200.
244. Maxilla ×20.

Marphysa nobilis Treadwell.

(Plate 6, figures 9 to 12; text-figures 245 to 256.)

Marphysa nobilis Treadwell, 1917, p. 265, plate 3, figures 3–9.

A large species, one of average size measuring 350 mm. in length, with a peristomial width of 4 mm. and of over 200 somites. At somite 17 the width was 7 mm., but behind this was a narrowing to the posterior end. These measurements were made on preserved material.

In life the body is flesh-color, due largely to contained blood, and is markedly iridescent. The only pigmentation is on the tentacles, which are white with green bands (plate 6, figures 9 and 10) and obscure yellowish spots on the anterior surface. The color of the posterior parts of the body is largely due to contained blood as well as to intestinal contents seen through the transparent body-walls. The red gills also affect the coloration.

The prostomium is plainly bilobed, though during life the depth of the median depression may vary greatly. When fully expanded its anterior margin is nearly straight, and the sides taper to a narrower base. The artist has drawn it as contracted and has drawn the median tentacle lying over the central depression. The tentacles are longer than the prostomium and are banded with green. Each green band lies in a constriction, but this is not a true articulation. There is one pair of small eyes.

The peristomium is about as long as the prostomium and is very faintly marked off from the second somite (plate 6, figure 10). Later somites are very short, but become much broader than the first (plate 6, figure 11). There are two pairs of anal cirri, one pair much longer than the other (plate 6, figure 12).

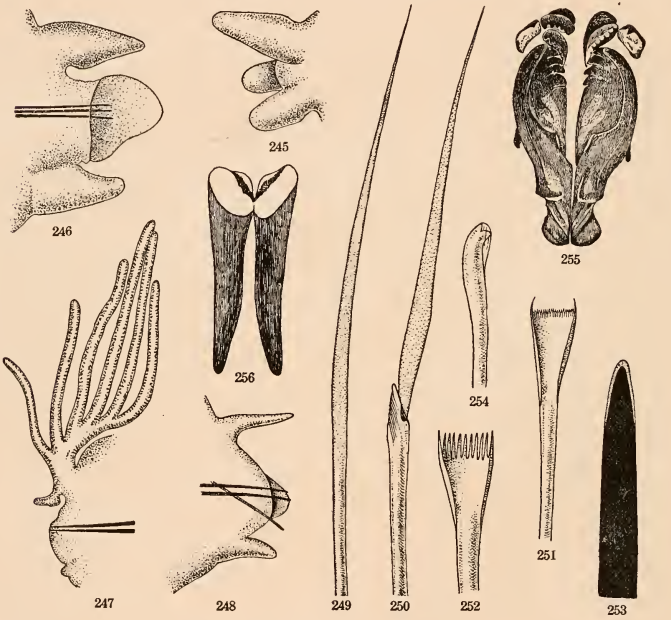
The gills begin as a single filament on somites 24 to 29 and become two-branched a few somites posterior to this. Through the middle of the body they have from 6 to 8 branches and are long enough to meet across the mid-dorsal line (plate 6, figure 11). Toward the posterior end they become smaller and eventually disappear entirely at about 45 somites from the posterior end.

The first parapodium (text-figure 245) has rather prominent dorsal and ventral lobes, with an unusually prominent cirrus-like, post-setal lobe. There are two short black aciculæ. In the tenth parapodium (text-figure 246) the setal portion is much more prominent than in the first, its pre-setal margin being truncated, but its post-setal drawn out into a broad triangular lobe. The dorsal and ventral cirri are nearly equal in size, conical, the dorsal a little more pointed than the ventral and with a notch on its ventral surface. Three very black aciculæ protrude in front of the post-setal lobe. The one hundred and fiftieth parapodium (text-figure 247) has a rounded post-setal lip, but this is much shorter than in the anterior somites. The dorsal cirrus is shaped much like that of the tenth, but is very small and apparently carried on the side of the stem of the gill. The ventral cirrus is a mere knob on the end of a swelling. Two very black aciculæ are present. Toward the posterior end (text-figure 248) the parapodium becomes more conical, but is in other respects much like anterior ones, the dorsal and ventral cirri, especially the dorsal, becoming very slender. In addition to aciculæ like those farther forward, a ventrally placed and lighter-colored one appears.

The simple setæ (text-figure 249) are long and slender, their terminal portions broadened, without fin or lateral denticulations. The compound setæ (text-figure 250) have their basal joints widened at the end and with rather strong denticulations, the terminal joint long, sharp-pointed, and with smooth edges. Through the region of the gills the compound setæ have relatively much shorter terminal joints than farther forward. There are two forms of pectinate setæ. The first (text-figure 251) occur in the anterior portion of the body. These have from 20 to 25 very small teeth, the ter-

minal teeth longer than the others. In the gilled somites a second form appears and in this region is more numerous than the first. These (text-figure 252) are flatter than the others and have about 12 equal-sized, very large teeth. The aciculæ throughout the anterior portion of the body and those situated dorsally in the parapodium farther back are very black in color with bluntly rounded ends, the extreme tip covered with a colorless layer (text-figure 253). The ventral acicula, which appears in posterior somites (text-figure 254), is much more slender, is widened a little toward the tip, and has terminal and subterminal teeth covered by a delicate hood. It is colorless at the apex, but the greater part of its shaft is a light brown.

The maxilla (text-figure 255) is very dark in color. The carrier is extremely short, the forceps long and heavy. The proximal paired plates have each 4 teeth, though



TEXT-FIGURES 245 to 256. *Marphysa nobilis* Treadwell.

245. First parapodium ×34.
246. Tenth parapodium ×34.
247. One-hundred and fiftieth parapodium ×18.
248. Posterior parapodium ×31.
249. Simple seta ×310.
250. Compound seta ×310.
251. Pectinate seta of anterior region ×310.
252. Pectinate seta of posterior region ×310.
253. Apex of acicula ×310.
254. Acicula from posterior end ×310.
255. Maxilla ×8.
256. Mandible ×8.

in immature individuals the terminal one of these may not be present. The right paired plate has 7 teeth; the left has 2 large and 2 small ones; the unpaired has 6. In these latter plates the margin is ordinarily smooth beyond the last tooth, but it may be notched into denticulations. On either side is a smaller plate with its corner curved to form a tooth-like edge, and there are crescentic patches distal to the plates. The mandible (text-figure 256) has rather heavy shafts, light brown on the outer surfaces but darker toward the inner. The beveled surface is covered with a whitish incrustation and there is a small patch of colored chitin distal to this.

Marphysa nobilis seems to be closely related to *Marphysa californica* (Moore, 1909, p. 251, plates 7 and 8, figures 13 to 20). To Professor Moore's courtesy I am indebted for the opportunity of examining a paratype of *M. californica* from the Museum of the Philadelphia Academy of Natural Sciences. This was about 45 mm. long, being thus much smaller than any of the *M. nobilis* which I have seen. It differed from *M. nobilis* in the flatter prostomium; in the fact that the gills begin on somite 19 instead of 29 and extend to much nearer the posterior end than in *nobilis;* in the gill-bearing somites the dorsal and ventral cirri are much larger and the setal lobe more pointed than in *nobilis;* the apex of the basal joint of the compound seta is not so sharply toothed and the terminal portion is shorter than in *nobilis;* the anterior cirri are longer and more slender; the body as a whole is much flatter. Moore's type was larger than the paratype, being 80 mm. long, but this is much shorter than any *M. nobilis* I have found. Some of these might be regarded as age differences, but the fact that in the smaller *M. californica* the gills have a greater extent than in the larger *M. nobilis* would be directly opposed to the idea that they are younger and older specimens of the same species.

M. nobilis first appeared in my collecting at Mangrove Key in Key West Harbor in 1915, and later in the same season a single specimen was collected at Long Key in the Dry Tortugas. In 1918 several were collected at Buccoo Bay in Tobago. A single specimen, now in the U. S. National Museum, was collected by the *Fish Hawk* at Garden Key in the Dry Tortugas in 1912, and I found one specimen in Montego Bay, Jamaica.

Marphysa languida, new species.

(Text-figures 257 to 268.)

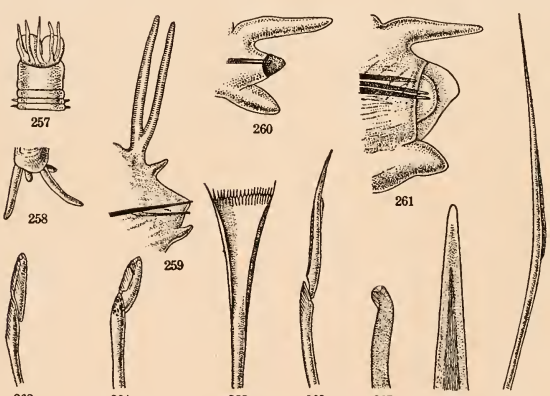
One entire specimen and the posterior portion of another were collected in May 1915, in rocks off Guanica Harbor, Porto Rico. The general appearance and habitat were much like those of *Leodice caribæa* (see p. 47), and they were at first taken for that species. The entire specimen after preservation was approximately 60 mm. long with a prostomial width of 1.5 mm. and about 200 somites. The living animal showed no color except for the contained blood in its vessels, giving it a pinkish tinge.

The prostomium (text-figure 257) is a little wider across its anterior than across its posterior border, the halves broadly rounded, the median sulcus extending for as much as two-thirds of the distance toward its posterior border. The tentacles are colorless, sharply pointed at the apex, and closely ringed but not articulated, the outer paired attached a little farther forward than the inner ones. The eyes are rather small, dark brown in color, just in front of the bases of the inner paired tentacles. In the living animal the peristomium is nearly twice as long at the margin as in the mid-dorsal line and its anterior margin is concave. It is nearly as long as the following three somites. The succeeding somites increase gradually in length and width as far back as the fiftieth. In the preserved specimens most of the body somites are very short, probably a contraction effect. There is a noticeable flattening of the body toward the posterior end. There are two pairs of anal cirri, one pair much longer than the other (text-figure 258).

The gills begin as a single filament on about the sixtieth somite; the number is increased to two filaments at about the eightieth somite, and gills extend to about fifty somites from the posterior end, the last few having only one filament (text-figure 259) from region of somite 110.

The first parapodium (text-figure 260) has a pointed posterior lip which is slightly asymmetrical, a long dorsal, and an oval ventral cirrus. Two small aciculæ extend to the surface between the two lips of the setal portion. The tenth parapodium (text-figure 261) has a relatively smaller dorsal cirrus; the ventral cirrus is a conical swelling at the end of a pad-like structure. The posterior lip is asymmetrically pointed; the end of the setal portion between the anterior and posterior lobes is rounded. Three dark-brown aciculæ reach the surface just behind the anterior lip. A later parapodium (text-figure 259, of about the one hundred and tenth) has a pointed setal lobe with little difference in the length of the anterior and posterior lips, a single strong acicula reaching the surface at the apex of the lobe, and a hooked ventral acicula which is much smaller than the dorsal. The dorsal cirrus is a very small conical structure and the ventral cirrus is also reduced to a small cone. In the entire animal the base of this cirrus is continued into a swelling which extends across toward the ventral midline. The gill-filaments are straight and of equal length, arising from the surface of the body dorsal to the insertion of the dorsal cirrus.

There are at least three kinds of setæ in the first parapodium: the compound (text-figure 262), each with a slender shaft, terminating in a single tooth, and denticulated proximal to this, the terminal portion slender with apical and subapical teeth covered by



TEXT-FIGURES 257 to 268. *Marphysa languida* Treadwell.

257. Head ×6.
258. Pygidium ×13.
259. One-hundred and tenth parapodium ×30.
260. First parapodium ×60.
261. Tenth parapodium ×60.
262. Compound seta from first parapodium ×334.
263. Second form of compound seta from first parapodium ×354.
264. Compound seta from middle of body ×354.
265. Simple seta from middle of body ×334.
266. Apex of dorsal acicula ×200.
267. Apex of ventral acicula ×200.
268. Pectinate seta ×666.

a hood; a second form of compound seta (text-figure 263) having basal portions much like the other, but with long, pointed terminal joints; one margin of these is roughened, but I could discover no true denticulation. The third form of seta is simple, shorter, but not in other respects differing from those found in later somites. In middle somites the compound setæ (text-figure 264) have basal portions much like those of the first parapodium, but the terminal joints are shorter and stouter and with a basal blunt tooth not found in the others. The simple setæ of later somites (text-figure 265) are long and slender, very sharp pointed at the apex, more or less bent, and with a narrow wing along the bend. This general form of seta, with variations in the degree of bending and in length, occurs in all parapodia. I was unable to find pectinate setæ in anterior somites, but a few occurred in the region of the one hundred and tenth. I did not attempt to determine their precise distribution. They have slender shafts, the end rather wide, with about 20 teeth, both terminal ones being longer than the others. In parapodia toward the posterior end of the body they become more numerous and with longer shafts, but I could find no important differences in form (text-figure 268).

The dorsal aciculæ of the middle region (text-figure 266) are smooth at the end, which is colorless, the middle region being a dark brown, which appears as black under low power. Through the middle and posterior regions I could find only one acicula to a parapodium. The ventral acicula (text-figure 267) is much smaller than the dorsal and is colorless.

The jaw apparatus was removed for examination and unfortunately lost before a drawing was made, so that nothing can be said about its structure.

Marphysa languida somewhat resembles a small *M. acicularum* (see p. 57), but differs in that the gills begin much farther back on the body and never have more than two filaments to a gill. The incomplete specimen was larger than the type, but agreed with it in all details.

The type is in the American Museum of Natural History.

Genus PARAMARPHYSA Ehlers.

Ernst Ehlers, Florida Anneliden, 1887, p. 99.

Prostomium lobed, with five tentacles. No tentacular cirri or gills. Similar to *Marphysa* in every respect except that it lacks gills. Maxilla with carrier, forceps, two pairs of paired and one unpaired plate, as in *Marphysa*, but more delicate in texture. The mandible is also like that of *Marphysa*, but more delicate.

Paramarphysa obtusa Verrill.

(Text-figures 269 to 278.)

Paramarphysa obtusa Verrill, 1900, p. 646.

This species did not appear in my collections, and the following description is based on alcoholic material loaned to me by Professor Verrill. The bottle was labeled as containing the type specimen, and in it were two entire individuals and parts of two others. According to the original description, the length varied from 25 to 35 mm., the breadth from 1 to 1.5 mm. The preserved material was a trifle smaller than this. There were approximately 95 somites in the entire individuals.

The prostomium is a trifle broader than long, with a clearly defined constriction in the median line (text-figure 269). Verrill states that the depth of this furrow depends on the method of preservation. The tentacles are nearly twice as long as the head and definitely clavate at the end. Verrill states that they may be tapered. Apparently this detail varies with the method of preservation or with different conditions in the living animals. The median tentacle is only a trifle longer than the others and a considerable space separates it from the base of the inner lateral. The inner and outer laterals arise close together, so that the base of the outer, when viewed from above, is obscured by the base of the inner.

The peristomium is nearly twice as long as somite 2. The parapodia begin on the third somite, the first being relatively rather large, and the following ones increase successively in length, the largest being from the sixth to the tenth. Behind the tenth they decrease in size and throughout most of the body they are very small, though with prominent setæ and aciculæ.

The first parapodium (text-figure 270) has subequal setal lobes with two very delicate aciculæ extending to just beyond their margin. The dorsal cirrus is long and not much tapered; the ventral one is very thick and heavy. In the one drawn there is a constriction near its middle, but I think this was due to handling and was not entirely normal.

The tenth parapodium (text-figure 271, drawn to the same scale as the first) has a prominent setal portion with a posterior lip slightly longer than the anterior, also a large light-brown acicula extending to the surface between them. The dorsal cirrus is long and slender, the ventral one very thick and with a conical apex. Simple and compound setæ are present in it, but I was unable to find any pectinate ones so far forward.

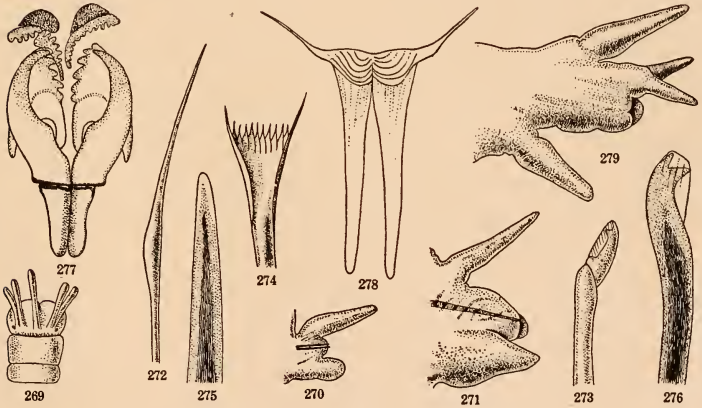
The parapodia farther back in the body are hardly more than slight elevations on the side of each somite, with very inconspicuous cirri. The dorsal cirrus is longer and more slender than the ventral, whose thickness about equals its length. A ventral hooked acicula is present, as are pectinate setæ. The shafts of all setæ are much longer than anteriorly, but the form of the simple and compound ones differs in no other respect.

The simple setæ (text-figure 272) have very slender stalks with an asymmetrical swelling near the end, tapering beyond this to an acute point. The compound setæ (text-figure 273) are very small, the shaft smooth at the end, the terminal joints each with an apical and subapical tooth. The pectinate setæ (text-figure 274) have not more than 12 teeth, the two terminal ones equal and longer than the others.

The anterior aciculæ have a bluntly rounded end, and in this respect they agree with the dorsal ones of later somites (text-figure 275). Each has a translucent margin with a brown central core. The ventral aciculæ of later somites are slightly enlarged toward the end, then bent slightly, and end with a terminal and subterminal tooth covered by a hood. Like the others, these have a central brown core (text-figure 276).

The maxilla is very small, the one drawn (text-figure 277) being not more than 0.75 mm. long. It is extremely delicate and transparent. The carrier is small, blunt-pointed posteriorly, with a faint, darker-brown outer margin and a broader patch of brown along the line of contact of the two halves. The forceps are relatively rather heavy. The proximal plates have 6 teeth on the right and 5 on the left, the right distal with 11, the left distal with 4, the unpaired with 5 larger and a very small sixth. A brown crescentic patch lies distal to each distal paired plate. The mandible (text-figure 278) is even more transparent than the maxilla, though a trifle longer. The shafts are very slender, united only at their distal ends. The beveled portion is very indistinct and there is a long horn-like process on either side. The only trace of color is a patch in the middle between the two halves of the beveled portion.

Paramarphysa obtusa was collected in shell sand at Flatts Inlet, Bermuda. The type is in the Yale University Museum.



TEXT-FIGURES 269 to 278. *Paramarphysa obtusa* Verrill.

269. Head ×24.
270. First parapodium ×142.
271. Tenth parapodium ×142.
272. Simple seta ×333.
273. Compound seta ×666.
274. Pectinate seta ×666.
275. Posterior dorsal acicula ×666.
276. Posterior ventral acicula ×666.
277. Maxilla ×66.
278. Mandible ×66.
279. First parapodium of *Onuphis magna* Andrews ×18.

Genus ONUPHIS Audouin et Milne Edwards.

Audouin et Milne Edwards, 1834, p. 151, plate 111*a*, figures 1–5.

Prostomium with seven appendages arranged in three rows, the anterior row of two "frontal tentacles" or "frontal palps," short and rounded at the ends. Other appendages long, carried on ringed cirrophores, a pair of eyes between the bases of the outer and inner paired tentacles. The anterior parapodia produced so as to extend in front of the prostomium. *Apparently* only a single achætous somite bearing nuchal cirri (see p. 5). Gills pectinate or simple, extending through a greater or less portion of the body. Anterior setæ large and hooked, other regions with slender simple and pectinate forms. Maxillæ and mandibles similar to *Leodice* in arrangement and structure.

The classification of the Leodicidæ with seven prostomial appendages has been much confused. Audouin and Milne Edwards described *Onuphis* as having five tentacles and two antennæ, while in the same paper (1834, p. 155, plate 111*a*, figures 6–8) they described as *Diopatra* a genus with nine head appendages. Since it was clear that in the latter case the nuchal cirri had been included in the nine, later writers have understood that *Onuphis* has no nuchal cirri. (Quatrefages, 1865*b*, p. 288; Ehlers, 1864–1868, p. 281, and 1887, p. 73.) It is, however, perfectly evident from figures 1 and 2*g* of Audouin and Milne Edwards and from their description "et de chaque côte du second" [somite] "on voit un petit cirri tentaculaire *g*," that *Onuphis* has these cirri, and the only distinction I can find between the two genera in their description is that *Onuphis* has pectinate and *Diopatra* spirally twisted gills. Quatrefages (1865*a*, pp. 344, 345) reexamined the type and stated that *Onuphis* has nuchal cirri. He transferred this specimen to *Diopatra*, retaining *Onuphis* for genera without these cirri. Kinberg (1864, p. 559) uses the gill structure as the distinction between the genera and he lists no genus without nuchal cirri. Malmgren (1867, p. 181) described *Hyalinœcia* without nuchal cirri, with oval antennæ and five tentacles. Grube (1878*b*, p. 83) remarked on the confusion which exists in the usage of these three genera and evidently thought that the composition of the tube and the position of the eyes are of importance in determining genera. He stated that in *Diopatra* the eyes are between the unpaired and the inner paired tentacles, though he admitted that in many cases the eyes are not to be seen.

So far as I can determine, accurate usage requires that we recognize only three genera in this group:

With nuchal cirri { Gills pectinate or simple.....*Onuphis*
Gills spirally coiled.....*Diopatra*
Without nuchal cirri.....*Hyalinœcia*

My collections have included only *Onuphis*. A comparison with *Diopatra* shows that the general appearance is very different in the two genera, the distinction being based not merely on the gill structure. *Northia*, used as a generic name by some writers, seems not to be a valid genus. Ehlers's (1887) species of *Diopatra glutinatrix*, *D. pourtalesii*, *and D. fragosa* are all *Onuphis*, while his *Onuphis* (*Paronuphis*) *gracilis* is an *Hyalinœcia*.

Onuphis magna Andrews.

(Plate 7, figures 1 to 5; text-figures 279 to 287.)

Diopatra magna Andrews 1891*a*, p. 286, plate 14, figures 14–20.
Diopatra magna Andrews, 1891*b*, p. 121, plate VIII, figures 1–7.

The animals varied much in length, a medium-sized specimen being 300 mm. long, width of prostomium 4 mm. The anterior region of the body has a pearly-gray appearance and a marked iridescence, the darkest portion being a little back from the anterior end. The frontal tentacles (seen below the median in figure 2, plate 7) have a length about twice their diameter and are colorless or with yellowish-brown pigment on their dorsal surface. The ceratophores of the other tentacles have about ten short basal rings and a much longer terminal one. The terminal joint of the tentacles is very long

and slender, colorless in small individuals, but in older ones with a brownish coloration throughout most of their length (plate 7, figure 2). It was not easy to get specimens with tentacles unbroken, but those that seemed most normal had the median and the inner paired ones about equal in length, while the outer paired were about two-thirds as long as the inner. In a 40 mm. specimen the inner tentacle extended to the sixteenth somite, but in larger ones the length of the tentacles was relatively less. The eyes (plate 7, figure 2) are very obscure, between the bases of the inner and the outer paired tentacles. The prostomium and palps had numerous brown spots, some of these as large as the eyes. The palps are very large, extending as far forward as the apex of the anterior tentacles.

The peristomium (plate 7, figures 1 and 2) is a trifle wider than the prostomium, with a distinctly folded anterior margin which may extend almost to the bases of the tentacles when the prostomium is withdrawn. The nuchal cirri are situated about in the middle of the peristomium, on a line with the bases of the outer paired tentacles, and extend beyond the ceratophore of the latter (plate 7, figure 2). Each has a median brown band and more or less color in the form of brown spots near the base. Succeeding somites (plate 7, figure 2) have these brown spots as prominent markings, sometimes arranged in three irregular transverse rows. Toward the middle of the body, owing to the development of a greater amount of dark pigmentation, these spots become less prominent and later disappear entirely. Toward the posterior end the body shows a decided orange tint (plate 7, figure 1) and in a sexually mature female may be tinted green from the spots of green pigment on the eggs seen through the body-wall. There are two pairs of very slender anal cirri, one pair much larger and longer than the other (plate 7, figure 4).

The first parapodium (plate 7, figure 2) is a fleshy cylindrical structure with the cirri carried well toward its apex and extends beyond the anterior border of the peristomium. The setal portion bears ventrally at its end two unequal rounded lobes (text-figure 279, p. 77) and dorsally two long equal cirrus-like processes. The dorsal cirrus is only slightly constricted at the base and extends beyond the terminal processes. The ventral cirrus arises nearer the body than the dorsal and is a little smaller than the dorsal, but of approximately the same form. A tuft of aciculæ lies in the upper part of the setal lobe and about 10 compound setæ arise from the setal lobe. This and later parapodia are marked with dark-brown spots like those on the body-wall.

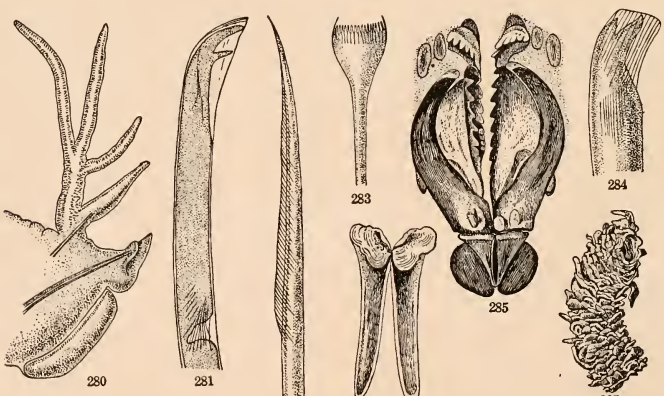
The second, third, and fourth parapodia are successively shorter than the first, extend beyond the body more nearly at a right angle, and lie successively nearer the ventral surface, so that the bases of the fifth pair are separated ventrally by a distance hardly greater than the length of the somite. Their form is essentially like the first, except that the ventral cirrus becomes more pad-like in appearance, and on the fifth parapodium it is a short, conical projection on the end of a thick pad. On the sixth parapodium only the pad is present and this is much larger than on the fifth. From the sixth to the twelfth parapodia these pads are placed at higher and higher levels, so that the twelfth is on the lateral margin of the somite. The tenth is the largest, and behind this there is a decrease in size to about the fiftieth; behind this they are continued to the end of the body, but retain a uniform size relatively to the body diameter. Anteriorly, brown spots occur on the ventral face of the somites and on the posterior surface of these pads, but as the latter become smaller the spots disappear and a pigment patch on the dorso-lateral surface of the pad makes its appearance.

The tenth parapodium (text-figure 280) differs decidedly from the first. The setal lobe has an antero-dorsal cirrus-like outgrowth and a longer postero-dorsal one, the latter continuous with a vertical plate which extends to the ventral edge of the setal lobe. The dorsal cirrus is shorter and more slender than in the tenth and is carried on the base of the heavy gill. The ventral cirrus, as stated above, is replaced by a large pad. A vertical row of stout setæ lies just in front of the posterior plate, and a smaller tuft of

similar setæ lies just posterior to the anterior dorsal lobe. Two large aciculæ lie in the setal portion, and a tuft of needle aciculæ extends into the dorsal cirrus. This form of parapodium is retained for a number of somites, but toward the middle of the body the ventral pad becomes shorter and the whole parapodium becomes conical in form, the end of the posterior lobe being the apex of the cone. The dorsal cirrus becomes very long and slender. Toward the posterior end the parapodia are longer and protrude to a greater distance from the body than anteriorly, but the form is essentially as before, as is the acicular arrangement. The dorsal cirrus is very slender, being larger than the gills in the region where the latter has only one filament.

The setæ of the first parapodium (text-figure 281) are very characteristic, being large and slender and of a glassy appearance. At the apex is a large terminal and a smaller subterminal tooth, the whole covered with a hood, which has a peculiar thickening at its apex. At a relatively considerable distance from the apex is a deep indentation on one side, which does not divide it entirely into basal and terminal joints. In the tenth somite the setæ of the vertical row are rather short, extending only a short distance from the surface of the setal lobe. Each (text-figure 282) has a stout stalk, tapering to an acute point, with narrow wings, only one being shown in the figure. The setæ of the dorsal tuft are larger than these, but do not differ essentially from them in form; among these are pectinate setæ (text-figure 283) with 20 or more short teeth. Toward the middle of the body the pectinate setæ make up most of the seta-tuft, though a few simple ones also occur. They all have much longer stems than anteriorly, extending to a considerable distance from the surface.

The gills begin with a one-branched form which arises on the seventh somite. On the next somite the number of filaments is 2, on the twelfth and later it is 3 or 4, and there is an increase to as many as 11 in some somites throughout the middle region of



TEXT-FIGURES 280 to 287. *Onuphis magna* Andrews.

280. Tenth parapodium ×18.
281. Seta from first parapodium ×193.
282. Seta from tenth parapodium ×193.
283. Pectinate seta ×310.
284. Hooded acicula ×193.
285. Maxilla ×12.
286. Mandible ×12.
287. Portion of exposed part of tube ×0.66.

the body; 10 is the usual number in this region. The filaments are slender, arising from a base which is at first stout but becomes smaller as each branch is given off, its apex making the terminal branch. The gills have a brownish color, due largely to pigment, though a part of their color is due to the contained blood. The gills are continued to almost the posterior end, the terminal ones consisting of a single slender filament.

Anteriorly the aciculæ have smooth ends, but posteriorly there are two ventrally placed hooded aciculæ (text-figure 284).

The maxilla (text-figure 285) is dark-colored, the carrier being black, the remainder dark brown with black margins. The carrier is wider than long, its lateral wings rounded, the forceps heavy. The proximal paired plates have 8 teeth on the right and 9 on the left, the toothed margin being noticeably straight. The distal paired plates have each 6 teeth, the unpaired has 5 anterior larger and 4 posterior smaller ones. Lateral to the distal paired plates are 2 smaller ones on either side. The mandible (text-figure 286) is very small as compared with the maxillæ, its shafts slender, smooth, dark brown, the beveled edge white with much brown marking.

The animal lives in tubes having a basis of a parchment material. Most of the tube is buried vertically in the sand, but a portion protrudes from the surface. The latter is covered with small bits of shell or other débris from the beach (text-figure 287). The tube is much longer than the animal, so that in case of danger it can retreat to a considerable distance below the surface. A small specimen was observed to turn around in its tube, and it is probable that larger ones are able to do the same, since the head may be found at either end of any given tube. The eggs are laid in jelly masses and a free-living ciliated larva results (plate 7, figure 5). These were obtained from specimens kept in a live-car at the Dry Tortugas (the animals were brought from the Marquesas) on July 15, 1914. I have no data as to the age of the larva figured.

Onuphis magna occurs in considerable numbers at the Marquesas, in sandy mud. In 1914 some were taken for study to Loggerhead Key in the Dry Tortugas and spawned in a live-car on the west side of the island. In 1915 tubes were found on the east side of the island and one was dug at Long Key. Since I had not seen it in the Tortugas in earlier collecting, it seems possible that those collected in 1915 were descended from those brought to the island the preceding year.

I have compared these specimens with Andrews's type of *Diopatra magna* in the U. S. National Museum, and find that they are identical. Having pectinate gills, they belong to the genus *Onuphis* instead of *Diopatra*. Andrews (1891*a*, p. 287) states that this is more common than *Diopatra cuprea* at Beaufort, North Carolina, and he thought that it was this species which lays eggs in long, cylindrical masses of jelly. He records it as measuring in some cases "upwards of 4 feet" in length. Andrews has also (1891*b*, pp. 113–120, plate VII, figures 1–7) described peculiar strings of cells attached to the ovarian eggs of this species, which he thought did not have any relation to the nourishment of the ova, but possibly are mechanical suspensors holding the ova out into the nutritive fluid contained in the cœlom. Some hitherto unpublished observations by the writer on *Diopatra cuprea* at Woods Hole demonstrated a definite communication pore between the ovum and the first cell of the chain, indicating that they are true "nurse" cells.

Andrews (1891*b*, p. 115, footnote) states that the larvæ described by Wilson (1882, pp. 288–291) as belonging to *Diopatra cuprea* are really of this species. Wilson, however, says that the gills are at first simple and only later acquire the spiral character. It is not clear whether Wilson saw this change in the gills or whether, knowing the gills of the adult *D. cuprea* to be spiral, and assuming these to be the larvæ, he inferred that this change occurs. If the former, the larvæ which he figured were not *Onuphis magna;* if the latter, they might have been, and Andrews's description of the form of the egg-string agrees with those I have seen in Florida.

Genus NEMATONEREIS Schmarda.

L. K. Schmarda, Neue Wirbellose Thiere, etc., 1861, p. 119.

Prostomium rounded, with one tentacle. Parapodium with dorsal and ventral cirri, simple and compound setæ. The maxilla has an unequal number of plates on the two sides.

Ehlers (1864–1868, p. 373) regarded *Nematonereis* as a connecting link between *Lumbrinereis* and *Lysidice*, basing this opinion on the reduced number of tentacles and the jaw apparatus.

Nematonereis hebes Verrill.

(Text-figures 288 to 297.)

Nematonereis hebes Verrill, 1900, p. 647.

A small species, specimens in my collection from Marshall Island, Bermuda, measuring about 12 mm. in length, with a prostomial width of not over 0.25 mm. and the greatest body-width, at a very short distance behind the head, of about 0.5 mm. There were about 75 somites. Verrill's specimens from Bermuda were 0.3 mm. in width, but 25 to 30 mm. long. I have studied two individuals from my own collection and one from Verrill's. No drawings were made of the living animal.

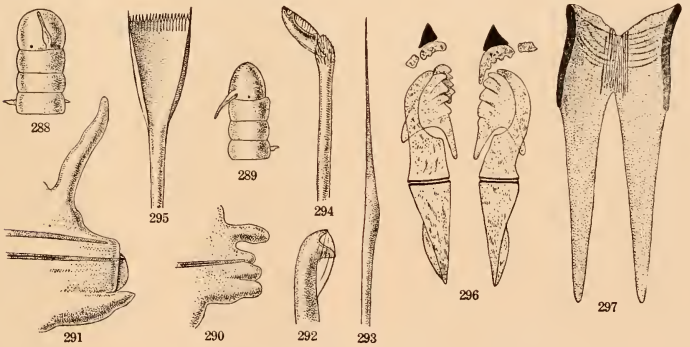
The prostomium (text-figures 288 and 289) is broadly rounded in front and a little broader than long. There is one median tentacle which is constricted at the base and swollen just beyond this. It terminates in an acute tip just behind the anterior border of the prostomium. There is one pair of small black eyes. The peristomium in preserved material is rather shorter than the prostomium and a little longer than somite 2. The parapodia begin on somite 3. The first parapodium (text-figure 290) has a rather large postero-ventral lobe, which is joined to the ventral cirrus, and a finger-shaped dorsal cirrus. There are a few setæ (2 simple and 2 compound in the one drawn) and a single acicula which reaches only to the surface. This is colorless, except for a short space about one-third of its length from the base, where it has a brownish center. The immediately following parapodia are very similar to this, but the setal lobe becomes broader and the post-setal lobe more rounded. The tenth parapodium (text-figure 291) has a conical ventral cirrus closely adherent to the setal portion; dorsal cirrus long and slender, as long as the parapodium. The posterior lip is rounded and the anterior one vertical. There is a straight acicula which is mostly colorless, but has a central brown axis for a part of its length; dorsal to this is another straight, colorless acicula, similar but shorter. As far back as about the fourteenth setigerous somite the parapodia are prominent and the somites are wider than long. Posterior to this point the somites elongate and the parapodia become relatively less prominent. They are more pointed at the apex, the larger dorsal acicula protruding from the apex. A ventral acicula (text-figure 292) with a bidentate hooded apex occurs.

Setæ are of three kinds. The simple is very slender (text-figure 293), enlarged toward the apex, and drawn out into a fine point. The one figured was taken from the first somite. Some of these simple setæ are bent very decidedly at the enlarged portion, but otherwise are similar to the one drawn. The compound seta (text-figure 294) has a relatively very long shaft, enlarged and finely denticulated at the apex, the terminal joint being short, bidentate at the apex, and with a small hood. The pectinate setæ possibly vary in different parts of the body, being perhaps larger posteriorly than anteriorly. I was unable to demonstrate them on all somites and can not be certain on this point. The one figured (text-figure 295) was taken from a posterior somite and was very broad in comparison with the tuft of other setæ, so that the shafts of the latter seemed to lie in the concavity of the pectinate.

Neither of my specimens retained the pygidium. Professor Verrill's shows the posterior end smooth, with no trace of metamerism for a length equal to 4 or 5 somites, then a slight enlargement forming the pygidium, which carried three anal cirri, one longer than the other two; apparently there were originally four. All were short.

The maxilla (text-figure 296) is delicate and transparent, the only noticeable color being two narrow bands at the junction between each carrier and the forceps, and the triangular plate distal to the distal paired, which are dark brown. (The parts were separated in mounting them for study.) The remainder of the apparatus is colorless by transmitted light, only very faintly straw-colored by reflected light. The carriers are long, nearly triangular in outline, with a very narrow wing at the posterior end. The basal portion of the forceps is nearly one-half of the whole, the terminal portion only slightly curved. Each proximal paired plate has 4 prominent teeth, with a rudimentary fifth on the right plate. The unpaired plate has 4 teeth, the distal paired plates have 2 on the left and 4 on the right. The drawing of the left distal paired plate may not be quite accurate as to outline. I was able to determine the number of teeth, but not the correct outline of the whole plate. There is an accessory plate lateral to each distal paired. The mandible (text-figure 297) is longer than the maxilla, has, so far as I could tell, very slender shafts (I was unable to remove enough of the adherent tissue in the specimens at my command to be quite sure of the outline of the shafts), and the distal portion shows a beveled area with concentric brown lines. In the figure these are seen through the transparent anterior end of the mandible, the drawing being from the dorsal surface. Each lateral uprolled edge is dark brown, and streaks of similar color occur at the point of contact of the two halves.

McIntosh (1910, p. 453, plate LIV, figure 3; plate LXIII, figures 5 and 5*a*; plate LXXV, figures 3 and 3*a*; plate LXXIV, figures 1–1*c*) described and figured *Nematonereis unicornis* Grube, with which *hebes* shows some points of agreement. This was first described as *Lumbriconereis unicornis* by Grube (1840, p. 80), but later Schmarda



TEXT-FIGURES 288 to 297. *Nematonereis hebes* Verrill.

288. Head from dorsal view ×34.
289. Head from latero-dorsal view ×34.
290. First parapodium ×200.
291. Tenth parapodium ×200.
292. Hooked acicula ×666.
293. Simple seta ×666.
294. Compound seta ×666.
295. Pectinate seta ×666.
296. Maxilla ×142.
297. Mandible ×142.

(1861, p. 119, plate XXXII, figure 254) defined the genus *Nematonereis* and described under it (as *N. unicornis*) a species with articulated tentacles. Quatrefages (1865*a*, p. 373) changed Grube's species to *Nematonereis grubei*, though evidently *unicornis* has precedence for this species. McIntosh makes his species synonymous with both of the above species, as well as with *N. oculata* (Ehlers, 1868, p. 374, plate XVI, figures 19–22), although this latter species has 4 eyes. Even assuming that the number of eyes varies with the age of the individual, I find it difficult to agree with McIntosh's synonymy. *Nematonereis hebes* agrees fairly well with McIntosh's description of *N. unicornis* Grube. but his were much larger and the general appearance of the body was quite different. His figures of the jaw apparatus were taken from mutilated specimens and are confessedly inaccurate, but his description would make them much like *N. hebes*. There are also differences in the form of the setæ and I could find no trace of a glandular swelling at the base of the dorsal cirrus on posterior somites, which he mentions as a distinguishing feature. The jaws of Ehlers's *oculata* might have been drawn from *hebes*, but in this animal the tentacle is much longer and the general form of the body is different, aside from the four-eyed condition mentioned above. The size differences between *hebes* and the other species might be due to age, but since Verrill's specimens and mine agree very closely in size and no larger ones have been found in Bermuda it seems as if no such explanation would hold.

Verrill gives no locality except "Bermuda" for his material. He records that three specimens were found, but I saw only one in his collection. From the fact that that one was a little smaller than the measurements he gave, I infer that it was not the type.

Genus LYSIDICE Savigny.

J. C. Savigny, Système des Annélides, etc., 1820, p. 13.

Prostomium rounded, with three tentacles. No nuchal cirri or gills. The jaw apparatus of maxilla and mandible, the former with carrier, forceps, and paired and unpaired plates resembling *Leodice*. The mandible like that found in *Leodice*, but usually very large as compared with the maxilla. Animals belonging to this genus are generally of small size.

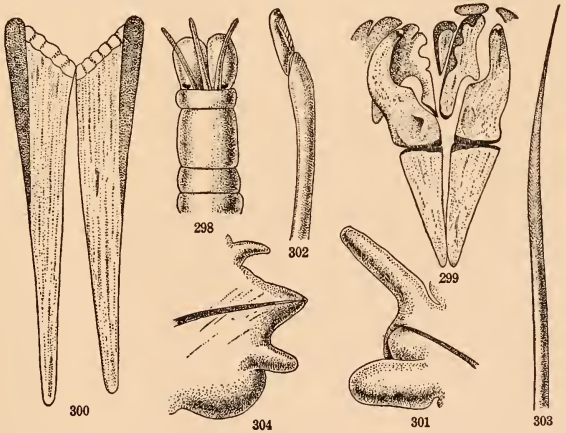
Lysidice tortugæ, new species.

(Text-figures 298 to 304.)

A very long, slender form, found in a sponge, dredged at the Dry Tortugas in 1915. One animal was occupying a tube exactly like that of *Leodice denticulata*, but since the tube seemed much too large for its occupant, I think that it probably belonged to the latter species. Parts of only two individuals were found.

In general appearance the animal is much like *Drilonereis attenuata* (see p. 107), and was at first mistaken for that species. The peristomial width was about 0.5 mm., but at its widest part, where it was distended with sex products, it measured as much as 1 mm. There were several hundred somites. The body narrows gradually toward the posterior end and there are two pairs of unequal anal cirri.

The prostomium (text-figure 298) is noticeably bilobed and relatively very large. The slender tentacles extend to beyond its margin, and a large, dark-brown eye is situated just outside the base of each lateral tentacle. The peristomium is very short



TEXT-FIGURES 298 to 304. *Lysidice tortugæ* Treadwell.

298. Head ×28.
299. Maxilla ×114.
300. Mandible ×92.
301. Second parapodium ×200.
302. Compound seta ×666.
303. Simple seta ×666.
304. Middle parapodium ×142.

dorsally, not more than one-third the length of the second somite. Neither of the first two somites has a parapodium.

The maxilla (text-figure 299) is faint brown as seen by transmitted light, with darker bands along the line of junction between the forceps and the carrier. The carrier is longer than the forceps, each half in the form of an elongated triangle, its inner basal angle nearly a right angle. The forceps has a very stout base, the terminal portions being very much narrower and bent at the apices. In the single specimen available for this drawing, the pieces of one side had been turned over and were drawn as seen, though this gives a distorted view of the right half. The proximal paired plates have each 3 large teeth and an unpaired plate lies just beyond them. In the position in which the latter lay I was unable to determine if its margin is toothed. Distal to these plates are, on either side, two small hook-like hardenings in the chitinous framework of the jaw. The mandible is much larger than the maxilla (text-figure 300). The halves are in contact only at their anterior ends, and the free margin bears a series of tooth-like thickenings. The anterior lateral margin of each half is much thicker than the rest and appears dark by transmitted light, simply because of its greater opacity, the whole mandible being without any trace of pigmentation.

The first parapodium was injured in removing the jaw, but the second was drawn. This (text-figure 301) has a heavy cylindrical ventral cirrus and a longer, more slender dorsal one. The anterior setal lobe is smaller than the posterior, and an acicula lies between the two. There is a tuft of setæ of the two kinds figured in text-figures 302 and 303. A parapodium from the middle of the body (text-figure 304) has ventrally a very large, thickened swelling from whose apex the small ventral cirrus extends. There is no distinction to be seen between anterior and posterior lips, and the large acicula extends to the tip of the setal portion.

The compound setæ (text-figure 302) are very small, the basal portion slightly bent and finely serrate. The terminal portion of each has an apical and a subapical tooth and the margin of its hood is serrated. The simple setæ (text-figure 303) are very long and slender, tapering to an acute point and serrated near the apex on both margins.

Type in the American Museum of Natural History.

Lysidice notata Ehlers.

(Plate 8, figures 1 to 4; text-figures 305 to 313.)

Lysidice notata Ehlers, 1887, p. 100, plate 30, figures 1–9.
Lysidice bilobata Verrill, 1900, p. 645.

Comparison of the descriptions of the two species by Ehlers and Verrill would indicate one very marked difference between them in the character of the prostomium. Ehlers describes and figures his *L. notata* as having a prostomium with an entire, rounded, anterior margin. Verrill, on the other hand, describes, though he gives no figure, his *L. bilobata* as having a deeply indented anterior margin to the prostomium. Since I can find no other differences between the descriptions, and since in my collections in the vicinity of Key West I find specimens in which this anterior indentation is practically lost in the alcoholic material, I am convinced that the two are identical. This view is strengthened by study of specimens from Bermuda. If this is the case, Ehlers's name has priority.

A small species occupying crevices in the decayed coral rocks in much the same localities as *Nicidion kinbergii*, but usually farther below the surface. General appearance is much like that of *Nicidion kinbergii* (see p. 91). An average specimen would be about 85 mm. long, with a head width of about 1.5 mm., and contains about 190 somites.

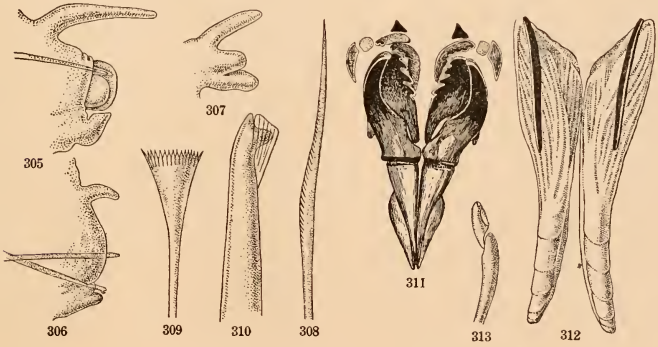
The prostomium is bent slightly ventrally, with a rather shallow median depression seen better from the ventral than from the dorsal surface. It is a trifle wider than the

peristomium and may extend decidedly beyond the level of the margins of the peristomium (plate 8, figure 1); its anterior lateral angles broadly rounded, its breadth about equal to twice its length. The eyes are black, kidney-shaped, situated at the outer side of the base of the paired tentacles (plate 8, figure 2). The tentacles are three in number, are a trifle longer than the prostomium (plate 8, figure 2), of a very delicate texture, and colorless; the peristomium (plate 8, figure 2) has a free dorsal margin which extends for a short distance over the latter. In life this margin is elevated and depressed with a rhythmical movement.

The general color of the body is a pearly white, modified by the reddish tint of the blood in the body-walls (plate 8, figure 1). Somites 3 and 8 have a deep-brown ground-color with numerous yellowish spots over the surface, the most apparent of these spots being arranged in a single transverse row near the anterior edge of the somite. Somites 7 and 9 may also show this coloration. The posterior third of the body is nearly pure white in immature individuals, but in mature females is, for the posterior third of the body, colored a dark green by the contained eggs.

The dorsal cirri at the anterior end are relatively rather prominent (text-figure 305), but posteriorly they become very small (text-figure 306). There are two pairs of anal cirri (plate 8, figure 4), of which the ventral pair is the shorter, hardly longer than the ventral cirri of the parapodia.

The first parapodium (text-figure 307) has a rounded setal lobe smaller than the ventral cirrus and a relatively rather stout dorsal cirrus. The tenth parapodium (text-figure 305) shows a rounded post-setal lip, with the end of the setal lobe in the form of a hemisphere surrounded by a depression, from the bottom of which the setæ arise. The ventral cirrus is short and asymmetrically sagittate in outline, while the dorsal cirrus is longer than the setal lobe and slender. A parapodium from the posterior third of the body (text-figure 306) has a uniformly rounded margin with a very small



TEXT-FIGURES 305 to 313. *Lysidice notata* Ehlers.

305. Tenth parapodium ×34.
306. Middle parapodium ×34.
307. First parapodium ×67.
308. Simple seta from first parapodium ×387.
309. Pectinate seta ×387.
310. Acicula from posterior parapodium ×387.
311. Maxilla ×32.
312. Mandible ×32.
313. Compound seta ×287.

ventral cirrus. The dorsal cirrus is also much smaller than in the anterior somites. The anterior parapodia have each a single acicula, to which in the later somites is added a more ventrally placed bifid one.

The setæ are alike throughout the body, varying in number in different regions and being especially prominent in the posterior somites. This prominence is mainly due to the relatively great length of the simple setæ, though the basal joint of the compound setæ are very long in this region. The compound setæ (text-figure 313) have the basal joints much expanded and denticulated at the apices, the terminal joints with apical and subapical teeth, though without any very definite basal tooth as described by Verrill (1900, p. 645). The pectinate setæ (text-figure 309) have about 13 teeth, though this number is not constant, the one drawn having 16. On account of their refractility, the structure of these teeth is hard to make out. Verrill describes his specimens from Bermuda as having about 10 teeth. The simple seta (text-figure 308) is elongated, flattened, and curved toward the apex, with numerous denticulations along one edge. The dorsal acicula in all somites has a simple apex, while the ventral one, which occurs only toward the posterior end, is bifid, with the subapical tooth larger than the terminal one and extending nearly at right angles to the shaft (text-figure 310).

The maxilla (text-figure 311) has a carrier nearly as long as the forceps, the latter being heavy and noticeably curved. These are brown at the base, but become very dark toward the apex, though this latter is covered with a whitish incrustation. The proximal paired plates are colored much like the forceps, and each has 4 prominent teeth. The distal paired plates have 2 teeth on the left and 5 on the right. The unpaired has 3 teeth. There are 2 small accessory plates on either side of the distal paired and a small pigment patch in front of each. The mandible (text-figure 312) is much larger than the maxilla, mostly colorless, but with a median darker area which may become very dark, and on the dorsal lateral surface (the surface turned toward the maxillæ) each has a prominent longitudinal black band, which is easily seen in the entire animal and which much resembles a similar band found in *L. sulcata*.

Except for points noted above, the specimens from the Tortugas agreed with Verrill's description of the Bermuda animals. In an earlier paper (Treadwell, 1901, p. 200, footnote) I suggested that this might be synonymous with *Lysidice sulcata*, which I described from Porto Rico. I have since compared the type of *L. sulcata* with these specimens and find that the two are decidedly different, some points of difference being indicated in my present description of *L. sulcata*.

The breeding season for this species at the Tortugas apparently begins about the first of July, for while I got no fertilized eggs, females with apparently mature eggs were found July 1, 1914.

Lysidice notata is rather rare in the Tortugas, especially as compared with *Nicidion kinbergii*, with which it is usually rather closely associated. More were found in the mud at Mangrove Key in Key West Harbor, and a few were collected in Bermuda in 1916 at Marshall Island. Ehlers's specimens were collected off Tortugas in 18 fathoms and in 310 fathoms at latitude 23° 03′ N., longitude 93° 10′ 5″ W. Verrill gave no locality except Bermuda for his *L. bilobata*. Specimens in the U. S. National Museum were collected at latitude 28° 45′ N., longitude 85° 02′ W., in 30 fathoms, and I found the species in Montego Bay, Jamaica.

Lysidice sulcata Treadwell.

(Plate 4, figures 13 to 15; text-figures 314 to 323.)

Lysidice sulcata Treadwell, 1901, p. 200, figures 47, 47*a*, 48.
Lysidice brachycera(?) Schmarda, 1861, p. 121, plate XXXII, figure 255.

A larger species than *L. notata*, though this would not so appear from the drawings. (Compare figure 1, plate 8, and figure 13, plate 4.) *L. sulcata* was drawn from a small specimen and on a smaller scale than *L. notata*. An average specimen measures about 125 mm. in length with a head-width of 3 mm., and contains something over 300 somites. In a footnote in the above paper I suggested that this might be the same as Verrill's *L. bilobata*, but this suggestion proves to be erroneous, that species being evidently synonymous with *L. notata* (see p. 86). In alcohol the two are not easy to distinguish, though the reddish color of *L. sulcata* often persists after preservation. It is usually stouter than *sulcata* and the head is flatter.

The prostomium (plate 4, figures 13 and 14) is colorless or very lightly tinged with pink, and is wider than the peristomium. The tentacles are shorter than the prostomium. (The contrary appearance shown in figures 13 and 14 is because the prostomium had been bent ventrally.) The tentacles are red through the greater part of their length, leaving the base and apex colorless. One pair of dark-brown eyes. There is a clearly marked, but not deep, indentation of the anterior edge of the prostomium.

The peristomium is a brilliant red marked with numerous yellow spots, and this coloration is continued through about the anterior third of the body, gradually fading to a yellowish brown. This body-color may also be much modified by the color of the sexual products.

The peristomium is about as long as the two following somites, while later ones become shorter (plate 4, figure 14). Their actual appearance depends on the degree of contraction, for the preserved animals often show much longitudinal contraction in the anterior third. The posterior half of the body shows a gradual narrowing. There are two pairs of anal cirri (plate 4, figure 15), one pair much larger than the other. The dorsal cirri are larger in anterior than in later somites.

The first parapodium (text-figure 314) has a slender dorsal cirrus, a much heavier ventral cirrus, and a setal lobe with anterior and posterior lips. The tenth (text-figure 315) has a slender dorsal cirrus and a small ventral one, borne on the end of a swollen base; also a rounded post-setal lobe. These anterior parapodia have a single acicula with a smooth tip. Later parapodia (text-figure 316) show a very great reduction in the size of the dorsal cirrus, but the ventral cirrus remains about as before. The post-setal lobe becomes pointed. In these there is one, or sometimes there may be two, ventral aciculæ, each with toothed apex.

The compound setæ (text-figure 317) have more slender terminal joints than in *L. notata* and the basal joints are not so noticeably widened. Toward the posterior end of the body the basal joints become much elongated, so that the setæ tufts are very prominent throughout all this region. The pectinate setæ (text-figure 318) have very slender stalks and 20 or more very delicate teeth. The simple seta (text-figure 319) is long and slender, expanded very slightly toward the apex, and narrowing beyond this to an acute tip. On either side there is a row of very obscure denticulations. The dorsal acicula (text-figure 320) is rounded, the whole acicula being very dark except at the extreme tip. The ventral acicula (text-figure 321) has a bluntly rounded lateral tooth near the apex, and the whole covered by a hood. This is also very dark in color except at the extreme end.

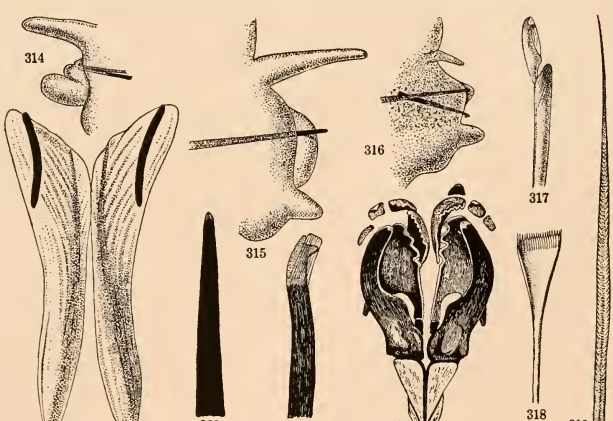
In its general appearance the maxilla resembles very closely that of *L. notata*, the most easily recognized distinction being the shorter carrier. The carrier (text-figure 322)

is relatively very short and except for the margins lighter in color than the remainder of the apparatus. The forceps has a rather heavy basal portion, the apical portion rather slender. The proximal paired plates each have 3 teeth, the distal paired ones have 5 on the right and 3 on the left, the unpaired has 7. There are two accessory plates on either side and some have a pair of black pigment patches distal to the whole apparatus. In the specimen figured, this appeared only on one side. The mandible (text-figure 323) is similar to that of *L. notata* in its general appearance and in the possession of a prominent black line on either half. In larger specimens it may become much calcified, from a ventral view appearing much like the mandible of *Leodice caribæa* (see p. 48).

Lysidice sulcata occurs in deeper water than *L. notata*, most of those in my collections having been dredged near Loggerhead Key, though several were obtained by dredging at Sand Key Light, in Key West Harbor. One was collected in the rocks off Guanica Harbor, Porto Rico. The *Fish Hawk* expedition to Porto Rico in 1898–99 collected it on reefs off Ponce, at Mayaguez Harbor in 22 to 33 fathoms, and off St. Thomas in 20 to 23 fathoms.

Schmarda (1861, p. 121, plate 32, figure 255) describes as *Lysidice brachycera* a species which seems to me to correspond with *L. sulcata*. It has the reddish-brown anterior region and in general is very like this except that the mandibles are fused through a greater part of their extent. The finer details are not, however, given in Schmarda's figures and from them it is not possible to be certain how the animal compared with my material. Schmarda, in his Latin diagnosis, speaks of three tentacles, but later refers to them as two. This is evidently a misprint. If these should prove to be identical with *sulcata* the name *brachycera* has priority.

Schmarda's specimens were collected in coral reefs off Jamaica.



TEXT-FIGURES 314 to 323. *Lysidice sulcata* Treadwell.

314. First parapodium ×34.
315. Tenth parapodium ×34.
316. Eightieth parapodium ×34.
317. Compound seta ×334.
318. Pectinate seta ×334.
319. Simple seta ×334.
320. Tip of dorsal acicula ×334.
321. Tip of ventral acicula ×334.
322. Maxilla ×28.
323. Mandible ×28.

Genus NICIDION Kinberg.

J. G. Kinberg, Annulata Nova, etc., 1864, p. 564.

Defined by Kinberg as having the general form of the Eunicidæ (Leodicidæ), but without gills. The jaw structure resembles that of *Leodice*. The parapodial development is feeble, especially throughout the middle and posterior regions. Small animals, sometimes confused with young *Leodice* in which the gills have not appeared, but easily distinguished because of the feeble parapodial development.

Nicidion kinbergii Webster.

(Plate 6, figures 5 to 8; text-figures 324 to 332.)

Nicidion kinbergii Webster, 1884, p. 320, plate 12, figures 81–88.
Nicidion kinbergii Treadwell, 1910, pp. 7–9, figures 15–22.

Webster's description was based on a single incomplete specimen collected in Bermuda by Goode. Later collections in the Dry Tortugas enabled me to add to his description, but my work was based on preserved material. What follows is written after the study of a large number of living animals and is intended to correct some errors in my earlier description as well as to greatly extend it.

The average specimen measures about 80 mm. in length, with a peristomial width of 2 mm., and about 140 somites.

The color is very variable, though the general body-color is usually a pale straw, with in most cases a considerable amount of reddish-brown pigment. Toward the middle of the body this pigmentation extends on to the ventral surface, but in succeeding somites it becomes less noticeable, to again increase in amount on the last four or five somites. In life the dorsal blood-vessel is very prominent, and the color of the middle and posterior ends of the body is much darkened by the accumulation of fecal matter in the intestine (plate 6, figures 5–8). The apices of the tentacles are white, and the dorsal surface of the peristomium may, as in figure 6, be covered with blotches of brown and yellowish white. Somites 4 and 5 are usually uncolored dorsally, though on one specimen somites 6 and 7 were thus uncolored. The dorsal surface of the prostomium, in the most deeply pigmented individuals, has two bands of pigment, beginning at the bases of the paired tentacles and extending to the anterior edge of the prostomium. From here each is continued as a narrower band, the two uniting along the ventral surface of the prostomium. Behind the tentacles are two colored bands making an X-shaped figure on the dorsal surface of the peristomium (plate 6, figure 6) and leaving a prominent colorless spot behind the median tentacle. With the exception of the fifth and sixth (or in some specimens the sixth and seventh), the dorsal surface of the anterior part of the body is densely pigmented and this is continued as anastomosing brown areas as far as the middle of the body.

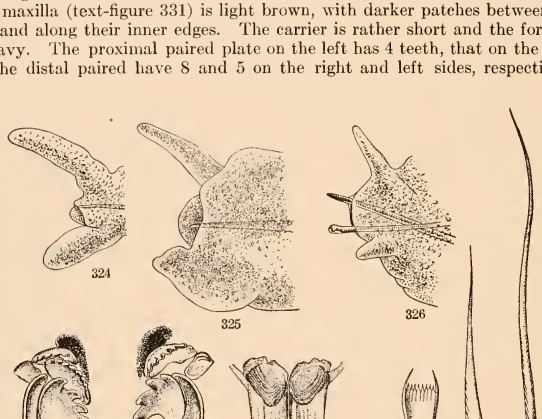
The tentacles (plate 6, figures 5 and 6) are nearly equal in length, not longer than the peristomium, the outer paired ones being slightly shorter than the others. There is one pair of black eyes. The prostomium is bilobed, but the lobes are bent ventrally, so that they scarcely show from the dorsal surface. The peristomium is as long as the following three somites; the somites immediately following it are rather short, but toward the posterior end they become much longer (plate 6, figure 5). The nuchal cirri are short and slender, not more than half as long as the peristomium, and the dorsal cirri are all short. There is generally one pair of stout anal cirri (plate 6, figure 8), though this number is not invariable. Some have four, which is probably the normal number.

The first parapodium has prominent dorsal and ventral cirri (text-figure 324) and a small post-setal lobe. Succeeding parapodia as far as the fifth are like this in form, but behind this the ventral portion of the cirrus becomes much swollen and attached

along its dorsal surface to the parapodium (text-figure 325). The dorsal cirrus becomes more slender in these later somites, in which there is a single acicula, its blunt end protruding between the parapodial lobes. At about somite 35 a second (ventral) acicula makes its appearance (text-figure 326, a parapodium from somite 70). Behind the region of somite 35 the cirri resemble those of figure 326.

The setæ are uniform in character throughout the body. The compound seta (text-figure 327) has the apex of the basal portion enlarged and finely denticulated, while the terminal portion is short, with three teeth of nearly equal size, and is covered with a finely denticulated hood. There are two forms of simple setæ (text-figures 328 and 329). One is long and slender, rather sinuous in outline, with numerous fine markings along either side; the other is shorter, expanded at the end and narrowed abruptly to a very acute point. Its concave margin is bluntly denticulated. The pectinate setæ (text-figure 330) have about ten teeth, the two terminal ones longer than the others.

The maxilla (text-figure 331) is light brown, with darker patches between the two portions and along their inner edges. The carrier is rather short and the forceps relatively heavy. The proximal paired plate on the left has 4 teeth, that on the right has 6, and the distal paired have 8 and 5 on the right and left sides, respectively; the



TEXT-FIGURES 324 to 332. *Nicidion kinbergii* Webster.

324. First parapodium ×66.
325. Tenth parapodium ×66.
326. Seventieth parapodium ×66.
327. Seta of first parapodium ×387.
328. Seta from middle of body ×387.
329. Seta from first parapodium ×377.
330. Pectinate seta ×387.
331. Maxilla ×34.
332. Mandible ×34.

unpaired has 7. There are small plates with inrolled edges lateral to the outer paired plates. The mandible (text-figure 332) is slender, its beveled edges colored a dark brown.

Webster gave no data as to the locality of his specimen. I found it abundant in Bermuda, in Montego Bay, Jamaica, and in Tobago, wherever there is decaying coral rock, as in the porous surface layer bored by sponges. It is abundant in the Tortugas in similar localities and it occurred in bottom rock dredged at 6 fathoms. It was found also in collections from Guanica Harbor and from Guayanilla Harbor in Porto Rico. At the Tortugas some were collected in sponges. A female collected in the Tortugas June 17, 1913, seemed to be nearly mature.

Subfamily LUMBRINEREINÆ.

(Genera represented in this paper.)

Dorsal cirrus rudimentary.
- Posterior border of mouth formed in part by a prolongation of second somite. Both capillary and hooked setæ ..... *Lumbrinereis*
- Posterior border of mouth not formed by second somite. Only capillary setæ present. Often with eyes.
  - Maxillary plates small, the terminal ones mere hooks ..... *Drilonereis*
  - Maxillary plates large, denticulated, sometimes asymmetrical ..... *Arabella*

Dorsal cirrus foliaceous.
- Three tentacles covered by the border of the prostomium ..... *Aglaurides*

Genus LUMBRINEREIS de Blainville.

H. M. de Blainville, Dictionnaire des Sciences Naturelles, 1828, p. 486.

Body elongated, slender, without prostomial appendages, gills, or parapodial cirri, but with anal cirri. The first somite interrupted ventrally by a prolongation of the second somite to form a portion of the posterior border of the mouth. Maxilla of short carriers, forceps, and three sets of paired plates, the proximal ones toothed, the others much smaller. Mandible about as long as maxilla, its anterior margin broad, narrowing decidedly posteriorly, the two halves more or less fused. Setæ compound, simple, and hooked.

Blainville's original spelling was *Lumbrinereis*. This, apparently for philological reasons, was changed by Grube (1851, p. 45) to *Lumbriconereis*, which term has been generally employed ever since. The original spelling should be retained. Grube (1879, p. 80) distinguished between *Lumbriconereis* with 4 pairs of plates in the maxilla and *Larymna* of Kinberg (1864, p. 572) with 5 pairs. Gravier (1900, p. 222) makes this same distinction and puts *Zygolobus* of Grube (1863, p. 40) under *Larymna*. Even though Kinberg makes the further distinction that the base of the forceps is smooth in *Lumbriconereis* and toothed in *Larymna*, it seems to me that the differences are scarcely sufficient to be of generic importance. I have not, however, seen any specimens of *Larymna*.

Lumbrinereis branchiata, new species.

(Plate 8, figures 5 and 6; text-figures 333 to 343.)

A smaller species than *L. nuchalis* (see p. 104), much resembling *L. candida* (see p. 96) in general appearance, especially in a grayish tint due to a dusting of fine spots. Preserved material shows no especial color characters, but the species may be recognized by the rounded lobes (gills?) occurring in the region just behind the middle of the body. In the process of preservation the specimen figured lost the last few somites with the pygidium. What remained measured 350 mm. and contained about 500 somites. The prostomial width was less than 1 mm. and the greatest body-width about 2 mm.

When fully expanded the prostomium is an elongated cone (plate 8, figures 5 and 6) wider at base than the somites just following it. When contracted it is about the width of the peristomium. In later somites there is a gradual increase in width at first and a noticeable narrowing toward the posterior end. There are two pairs of equal, conical anal cirri.

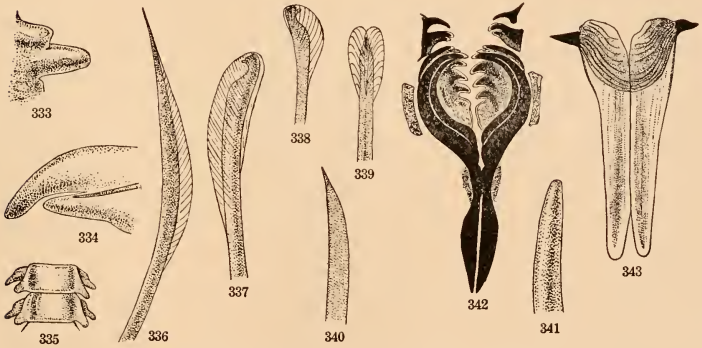
The first parapodium is very minute, the first setæ appearing as if they arose directly from the body-wall. The tenth (text-figure 333) is well developed, with a setal and postsetal lobe and a vertical row of setæ between them. A parapodium from behind the middle of the body (text-figure 334) has slender lobes, the posterior much longer than the setal. In this region many somites have on their dorsal posterior outer angles (see figure 5, plate 8, in upper right-hand corner, and text-figure 335, a dorsal view of two somites) a flattened expansion which in the living animal is filled with blood and evidently functions as a gill. These seem variable in their occurrence and may be retractile.

The anterior parapodia have two forms of simple setæ: one (text-figure 336) sharp-pointed, curved toward the apex, and with a marginal wing; the other (text-figure 337) curves slightly toward the apex, narrows to a slender neck, and terminates in 5 teeth, of which the basal one is the largest, the whole covered by a hood. The posterior parapodia have only one form of seta (text-figures 338 and 339); these have a subterminal constriction and a terminal row of teeth, of which the basal one is the largest. Figure 339 shows one of these in full face, demonstrating the double nature of the hood which covers the apex. These are all much shorter than in most species of this genus, being scarcely longer than the posterior lobe of the parapodium. The anterior aciculæ (text-figure 340) are slender and sharp-pointed; the posterior ones (text-figure 341) are much larger and with a bluntly rounded apex.

The maxilla (text-figure 342) is somewhat similar to that of *L. nuchalis* (see p. 105) but the carriers and forceps are longer and more slender. The proximal paired plates have each 3 large teeth and 2 terminal smaller ones, the terminal ones being at a higher level than the others. The second pair of plates have 2 teeth and the third pair 1 tooth. The mandible is more slender than in *L. nuchalis*, the halves more distinct, and there is practically no color in the shafts (text-figure 343). The beveled portion is marked with concentric brown lines. In the specimen figured the outer angles of the beveled portion were drawn out into sharp points. These did not appear in other specimens.

Collected in April 1918, in sand, in Buccoo Bay, Tobago.

Type in the American Museum of Natural History.



TEXT-FIGURES 333 to 343. *Lumbrinereis branchiata* Treadwell.

333. Tenth parapodium ×55.
334. Posterior parapodium ×55.
335. Dorsal view of somites showing branchial lobes ×6.
336. Anterior simple seta ×220.
337. Anterior hooded seta ×380.
338. Posterior simple seta ×220.
339. Posterior seta in face view ×220.
340. Anterior acicula ×220.
341. Posterior acicula ×220.
342. Maxilla ×38.
343. Mandible ×38.

Lumbrinereis candida, new species.

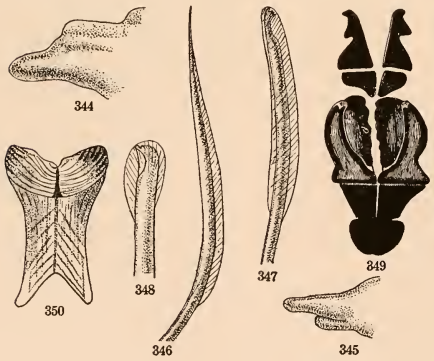
(Plate 8, figures 7 to 9; text-figures 344 to 350.)

A rather small species. A preserved specimen, about 300 mm. long, had over 300 somites, a prostomial width of 1 mm., and a body diameter of 2 mm.

In life the prostomium is an elongated cone (plate 8, figures 7 and 8), at its base about equal in width to the first somite. When moving, the prostomial margin is frequently drawn back, so as to expose the rounded lobes of the everted nuchal organs. Each of these has a reddish longitudinal dorsal line, probably a blood-vessel, which gives it the appearance of being longitudinally divided, the whole looking like a row of short tentacles overlapped by the prostomial margin (plate 8, figure 8). The anterior end is bright pink in color, with more or less of a grayish tint, and by the tenth somite this latter becomes very marked. When fully developed this coloration appears as a transverse band of minute gray spots running entirely around the body. The precise tint of the middle and posterior regions depends on the distribution of these gray spots and the condition of the blood-vessels in the intersegmental constrictions. In the median region the surface above and below is a greenish gray, with a darker tint along the parapodial line. In the posterior region the gray bands are narrower, and usually the blood in the intersegmental constrictions gives them a dark wine-color (plate 8, figure 9).

The parapodia are prominent from the very first, and in the posterior region are wider than half the body diameter. They have approximately the same form throughout. (See text-figure 344 of the tenth and figure 345 of the two-hundredth.) Each has a rounded setal and elongated posterior lobe. In the tenth there were a few straight aciculæ, but I could find none in the two-hundredth. There are two pairs of short conical anal cirri.

In the anterior somites there is a vertical row of setæ, following the order which is frequent in this genus, viz: dorsally several pointed winged ones, then several hooded hooked ones, and finally on the ventral surface a single one like the dorsalmost, but shorter. In the posterior regions there are only a few (three or four) hooked and hooded ones with long shafts and small hoods. The winged setæ (text-figure 346) have long, slender, curved, and pointed shafts with striated hoods. The anterior hooded ones (text-



TEXT-FIGURES 344 to 350.

Lumbrinereis candida Treadwell.

344. Tenth parapodium ×80.
345. Two-hundredth parapodium ×80.
346. Seta from anterior parapodium ×380.
347. Seta from anterior parapodium ×380.
348. Posterior seta ×380.
349. Maxilla ×35.
350. Mandible ×35.

figure 347) have narrow necks and heads with four teeth, covered by a hood which extends for a considerable distance down the shaft. The posterior setæ (text-figure 348) have nearly straight shafts with narrow necks and terminal teeth, of which the one on the convex side of the shaft is the largest. The apex is covered by a short hood.

The maxilla (text-figure 349) has short, broad carriers, which in the specimen drawn were slightly asymmetrical. The forceps is short and much curved. The proximal paired plates have rough edges, but I could find no true teeth. Two pairs of distal plates are semicylindrical in form and vary in appearance with their position. They are drawn as they appear in the normal dorsal view. The inner faces are without teeth and represent the median margin of the half-cylinder. The mandible (text-figure 350) is fused throughout practically its entire extent and is very broad in comparison to its length. The beveled portion is marked with dark concentric lines.

L. candida was collected in fine sand around plant roots in Buccoo Bay in April 1918. They are very fragile and difficult to collect unbroken. Two entire specimens were put in a dish of sea-water, but both were broken the next morning. The bottle labeled "type" contains an anterior and a posterior end from this lot, but I can not be certain that both came from the same individual.

Type in the American Museum of Natural History.

Lumbrinereis cingulata Treadwell.

(Plate 7, figures 6 to 9; text-figures 351 to 356.)

Lumbrinereis cingulata Treadwell, 1916, p. 263, plate 2, figures 7–12.

An unusually small representative of this genus, the largest individuals being not more than 40 mm. long with a prostomial width of 1 mm. The type was 37 mm. long and contained 98 somites.

The prostomium, when extended, is broadly rounded, the length a little greater than the breadth (plate 7, figure 6). There are no eyes, though some specimens show near the anterior border of the prostomium two rather large brownish patches. The prostomium is studded, both dorsally and ventrally, with minute tubercles, clearly seen only under rather high power. These appear dark by transmitted but white by reflected light (plate 7, figure 7).

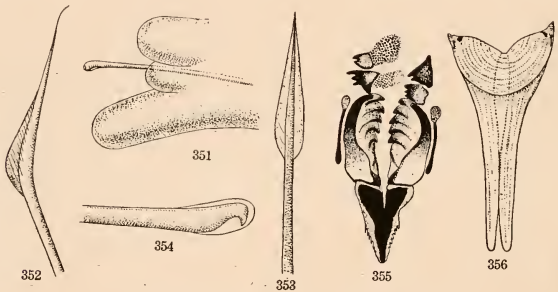
The first two somites are about equal in size, apodous, with tubercles similar to those on the prostomium, and each is marked dorsally by two prominent bands of dark pigment spots (plate 7, figure 7). The tubercles appear on all of the other somites, though, with the exception of the last somite, they are less numerous than anteriorly. The somites behind the second show a narrow transverse median pigment band with occasionally a very narrow band at the anterior and the posterior margins of the somite (plate 7, figures 6 and 8). These become fainter posteriorly and disappear entirely toward the middle of the body. Ten or more somites at the posterior end have on their ventral surfaces a band of black pigment which is broader in the middle of the somite, but narrows in the intersegmental constrictions. The body is soft and easily broken and secretes large quantities of mucus. There are two pairs of stout, subequal anal cirri (plate 7, figure 9).

The parapodia are uniform in character throughout the body, but relatively more prominent in the posterior somites. Each has a prominent postero-dorsal and antero-ventral lobe, the former much the more prominent (text-figure 351). I was unable to find any aciculæ. In the anterior somites the winged setæ (text-figures 352, 353) were the more prominent, though in the fifth somite of one individual I saw a hooded seta which barely protruded through the surface. Behind the sixteenth somite only the hooded setæ (text-figure 354) appear, and posteriorly these become very prominent.

Each winged seta has two flattened expansions, set at an angle with each other, the whole marked with many diagonally arranged striations. In many the apex was much more elongated than in the specimen figured. The hooded setæ have 4 or 5 small teeth dorsal to the large tooth.

The maxilla (text-figure 355) is dark brown in color, the carrier very dark, but with a lighter margin. The basal portion of the forceps is rather broad and long, extending for more than half the length, while the terminal portion is slender and curved. This terminal portion is much darker than the basal. The proximal paired plates have 5 large teeth on either side, the latter dark brown, while the remainder of the plates are much lighter. Of the two pairs of distal paired plates, the inner have 3 and the outer have 2 teeth. Each is continued laterally into a chitinous plate dotted with black. In the figure the plates on the left side are inverted in order to show these continuations.

The mandible (text-figure 356) is very delicate and transparent and difficult to separate from the maxilla. The only marked trace of color is a small patch of pigment on the outer anterior angle, the concentric lines being marked only very faintly with yellow. The separation of the beveled portion into two halves is not as complete as in other forms, the lines extending completely across from one side to the other. The mandible figured was from a Bermuda specimen, the maxilla from one collected in the Tortugas.



TEXT-FIGURES 351 to 356. *Lumbrinereis cingulata* Treadwell.

351. Parapodium ×194.
352. Winged seta in profile ×307.
353. Winged seta in face view ×307.
354. Hooded seta ×307.
355. Maxilla ×60.
356. Mandible ×60.

The first collection of *L. cingulata* was in dredgings about 12 miles south of Loggerhead Key, the animals living in fine crevices in the bits of broken coral which cover the bottom in some localities. In Bermuda I found them common in the crevices in the decayed surface of the coral rocks at about low-tide mark, living in association with *Nicidion kinbergii*. One was taken in Tuckerstown Bay, in a bit of hollow plant stem lying in the mud. A few were found on Buccoo Reef, Tobago, and in Montego Bay, Jamaica.

Type in the American Museum of Natural History.

Lumbrinereis paucidentata, new species.

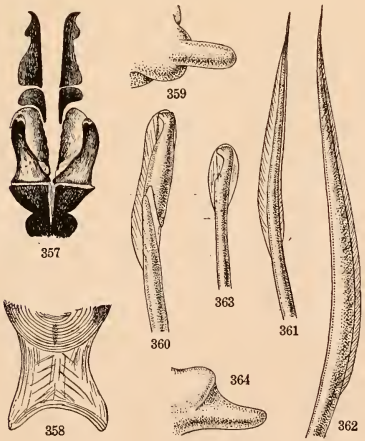
(Plate 9, figures 1 to 4; text-figures 357 to 364.)

Only one specimen was obtained. It is a small species, having a peristomial width of 1 mm., a body-width of 2 mm., and contains approximately 200 somites. Its general appearance and especially its jaw structure are so different from anything else that I have no hesitation in founding a new species on this one specimen.

In life the anterior region is a bright scarlet, shading into yellow posterior to the fifteenth somite (plate 9, figures 1 and 2). Through a part of the intestinal region the color is olive-brown with a greenish dorso-median patch in each somite (plate 9, figure 3), while posteriorly it is reddish yellow (plate 9, figure 4). The prostomium is acutely conical, its length a trifle greater than its width (plate 9, figure 2). The first two somites are not sharply separated dorsally, but this line is more distinct laterally. On the ventral surface the first somite is broken by the anterior prolongation of the second, as is characteristic of this genus, and there is one pair of rather prominent lips. Parapodia begin on the third somite and are prominent from the beginning. There are two pairs of stout anal cirri (plate 9, figure 4), the ventral about one-third larger than the dorsal.

The maxilla (text-figure 357) has a short and relatively very broad carrier (the apex had been lost in the one figured) with short and relatively broad forceps. The proximal paired plates have each a row of about 5 protrusions along the edge, which are hardly large enough to be called teeth. There are two pairs of distal plates, each plate of a semicylindrical form, with no definite teeth. The view here shown represents about one-half of the semicylinder. The mandible (text-figure 358) is very unusual in form, being scarcely longer than broad and with the two parts united practically along their entire margins. Both ends are marked with concentric brown lines, those at the anterior end being the more prominent.

The first parapodium (text-figure 359) is relatively large and has a long, cylindrical posterior lobe. It carries a tuft (there were four in the one drawn) of long, simple setæ,



TEXT-FIGURES 357 to 364.

Lumbrinereis paucidentata Treadwell.

357. Maxilla ×34.
358. Mandible ×34.
359. First parapodium ×54.
360. Compound seta ×194.
361. Smaller anterior simple seta ×194.
362. Larger anterior simple seta ×194.
363. Posterior simple seta ×194.
364. Tenth parapodium ×54.

extending beyond the parapodium for more than the length of the lobe, and about the same number of compound setæ, the latter of the peculiar form shown in text-figure 360. There are some chitinous rods in the interior of the parapodium, but I was unable to determine whether they are aciculæ or bases of broken setæ. Later somites differ from the first only in the relative size of the posterior lobe.

The tenth parapodium (text-figure 364) carries three kinds of setæ. Two of these are simple, each (text-figures 361 and 362) with a broad wing. Beside the simple setæ are compound ones (text-figure 360). The basal portion of a compound seta has a narrow, bluntly pointed apex which is in contact with the base of the terminal joint, but elsewhere separated from it by a considerable distance. The terminal joint has a narrow neck, with a large terminal tooth, a second smaller tooth dorsal to this, and a row of minute denticulations beyond this. A hood covers both the terminal and the end of the basal joints and is apparently a continuous structure, though there is a small indentation opposite the end of the basal portion.

In the posterior part of the body only one kind of seta occurs (text-figure 363), having a very long shaft terminating in a narrow neck and bent head, the latter with one very large tooth and a number of much smaller fine ones. A rounded but slightly asymmetrical hood covers the apex.

Collected July 21, 1914, at the Dry Tortugas. The specimen was a female with eggs. It seems to be somewhat closely related to *L. bidens* of Ehlers (1887, p. 103, plate 31, figures 7–17), but there are important differences in the form of maxilla and mandible.

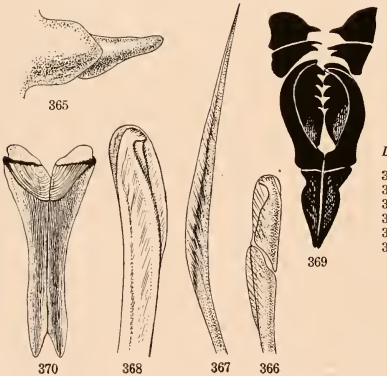
Type in the American Museum of Natural History.

Lumbrinereis floridana Ehlers.

(Text-figures 365 to 370.)

Lumbriconereis floridana Ehlers, 1887, p. 103, plate 30, figures 10–15.
Lumbriconereis floridana Treadwell, 1901, p. 198, figure 41.

No drawings of the living animals were made. In alcohol the specimens are colorless. The prostomium, seen from above, is semicircular in outline, and no eyes are visible. The first parapodium is rather large, and later ones increase in size up to the tenth, which is the largest.



TEXT-FIGURES 365 to 370.

Lumbrinereis floridana Ehlers.

365. Tenth parapodium ×34.
366. Compound seta ×310.
367. Simple seta ×232.
368. Hooded seta ×194.
369. Maxilla ×20.
370. Mandible ×21.

The first parapodium has a broad base and a conical posterior lobe. The tenth (text-figure 365) in general outline is something like the first, but larger and more slender. Later parapodia do not differ essentially from these.

The setæ of the first parapodium are all compound (text-figure 366), the terminal joint with 2 large and 3 small teeth, the whole covered by a hood. A similar hood covers the apex of the basal joint. In the tenth parapodium similar compound setæ are found, accompanied by simple ones. The simple setæ (text-figure 367) are curved and sharp-pointed and with a wing along the margin. The posterior part of the body has only one form of seta; these are simple, rather stout, with a bent toothed apex and a hood extending for only a short distance down the basal portion (text-figure 368).

The maxilla (text-figure 369) has a slender, rather elongated carrier, the forceps slender. The proximal plates have each 4 teeth, the distal two pairs have 2 and 1, respectively. The whole apparatus is dark brown in color. The mandible (text-figure 370) is much lighter in color, with the shafts firmly united along their entire length and the beveled portion with concentric lines. A heavy white incrustation borders the beveled surface anteriorly.

My collections from the Dry Tortugas contained some incomplete specimens and others were in Verrill's Bermuda collections. The U. S. National Museum has specimens from Key West and from latitude 25° 47′ N., longitude 80° 05′ W., in 85 fathoms. Ehlers's specimens were collected at Key West in 7 fathoms.

Lumbrinereis nasuta Verrill.

(Plate 7, figures 10 to 12; text-figures 371 to 377.)

Lumbrinereis nasuta Verrill, 1900, p. 651.

Living specimens (plate 7, figures 10, 11, 12) showed more or less brownish pigmentation, especially toward the anterior region of the body, the median and posterior regions being much lighter. The color of the animal is also much modified by the tint of the blood showing through the body-wall and by the surface iridescence. There are several irregularly grouped patches of pigment on the surface of the prostomium. Alcoholic specimens are dark, rather dirty brown in color, and very markedly iridescent for the first 30 somites, while behind this there is much less iridescence and a much lighter body-color. My Bermuda collections in 1916 contained two lots, one from Tuckerstown Bay and one from Boat Bay. The individuals differed very much in size, those from the latter locality being hardly more than half as large as those from the former. The smaller ones were also nearly devoid of color after preservation. They agree with the large ones, however, in the structure of jaws and setæ, so that there is no question of their identity. The peristomial width of larger specimens is 1.5 mm., with a diameter of 44 mm. in the widest portion.

The prostomium (plate 7, figure 11) is a relatively elongated cone with brown patches on its dorsal surface and a narrow base. The peristomium is a trifle wider than the prostomium and nearly twice as long as the second somite. There is a gradual increase in width to about the twenty-fifth somite, but a gradual narrowing behind this point.

The first parapodium (text-figure 371) has a rather thick setigerous lobe with small seta-like aciculæ. The posterior lobe is nearly as thick as the setigerous portion at the base and tapers gradually to a blunt apex. The tenth parapodium (text-figure 372) has essentially the same structure as the first, but with a more prominent posterior lobe. In later parapodia the only modification of this structure which appears is the elongation of the basal portion, so that the whole organ extends to a greater distance from the body. There are two pairs of subequal anal cirri.

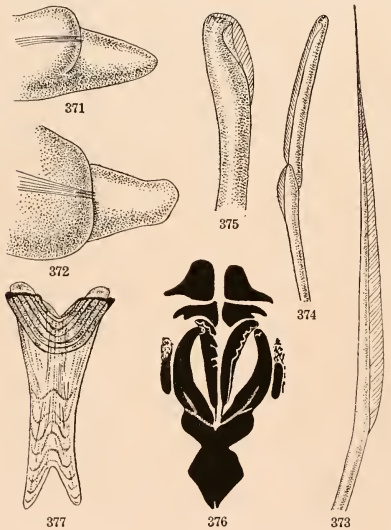
Anteriorly there are two kinds of bilimbate setæ. The first are simple (text-figure 373), bent toward the apex and very sharp at the end, with a pair of broad wings along the bent portion. (From a side view only one of these wings is seen.) The second form is compound (text-figure 374), with the terminal joint long and slender, ending in a narrow neck and recurved head, carrying at its apex a row of subequal teeth. There is a slender fin, striated like that of the simple seta. On the side of the apex of the basal joint is a similar but very short fin.

Toward the middle of the body these setæ disappear and their place is taken by a longer and stouter seta (text-figure 375). This has a narrow neck, followed by a recurved head, bearing one ventrally placed heavy tooth with two much smaller ones distal to it, and terminating in a row of very small denticulations. The whole is covered by a "hood" made up of the two fins, of which only one is shown in side view.

The maxilla (text-figure 376) is very dark in color, the carrier short and broad, and deeply constricted on either side. The forceps is slender and much curved. In both specimens at my disposal they showed patches of much more transparent material near the middle of their basal portion.

The proximal plates have each 6 teeth, the following two pairs have 2 and 1, respectively. In the figure these latter plates are inverted, the normal position of the teeth being toward the median line. On either side, near the forceps, is a patch of pigment.

The mandible is relatively very little bifid and is much lighter in color than the maxilla (text-figure 377). The beveled portion is marked with concentric dark lines which are much darker at their anterior ends; a lighter tint colors the spaces between



TEXT-FIGURES 371 to 377.

Lumbrinereis nasuta Verrill.

371. First parapodium ×60.
372. Tenth parapodium ×60.
373. Simple seta ×247.
374. Compound seta ×247.
375. Posterior seta ×247.
376. Maxilla ×27.
377. Mandible ×27.

them for the outer two-thirds of their course. The shaft of the mandible is marked toward its posterior end by brown concentric lines much more easily seen on the dorsal than on the ventral surface.

My specimens of *L. nasuta* were taken from Tuckerstown Bay and Boat Bay, Bermuda, while Verrill's were from Flatts Inlet, thus not far removed from the former of my two localities.

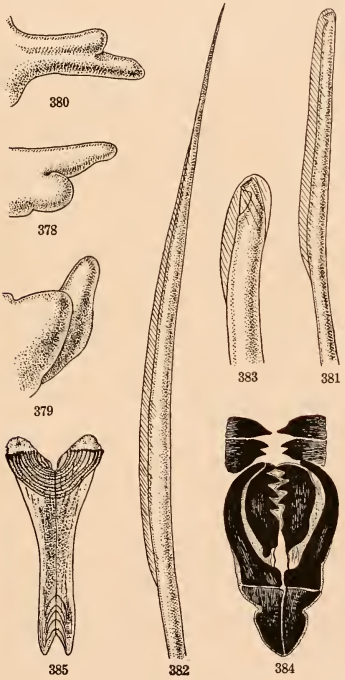
Lumbrinereis maculata Treadwell.

(Plate 8, figure 10; text-figures 378 to 385.)

Lumbriconereis maculata Treadwell, 1901, p. 198, figures 42–44.

The anterior end of the living animal (plate 8, figure 10) shows the general coloration characteristic of this genus, and the prostomium is characterized by three pigment patches, rather indefinite areas of pigment, one in the median line and one on either side, the lateral ones being the larger. These pigment spots persist in alcohol.

The prostomium is a blunt sugar-loaf form (plate 8, figure 10), the first two somites approximately equal in length and without parapodia. This relative length of the two



TEXT-FIGURES 378 to 385.

Lumbrinereis maculata Treadwell.

378. First parapodium ×34.
379. Tenth parapodium ×34.
380. Posterior parapodium ×34.
381. Anterior seta ×194.
382. Simple seta ×194.
383. Seta from posterior end ×194.
384. Maxilla ×22.
385. Mandible ×22.

somites may vary, as alcoholic specimens showed the first somite much longer than the second. One specimen contained 150 somites and was 2 mm. wide in the widest portion. The body somites are marked with median transverse bands, which vary in color but are usually dark brown. There are apparently four rather stout anal cirri. As compared with other species of this genus in this locality, the parapodia are very prominent, especially toward the posterior end, where they are very long and narrow. Preserved specimens usually show a progressive increase in size of the parapodia from the first to the tenth, while behind the tenth they are all very prominent.

The first parapodium (text-figure 378) shows a rounded anterior and a pointed posterior lobe, the latter more slender than is the case farther back. The tenth parapodium (text-figure 379) shows a dorso-ventral increase in diameter, the posterior lobe being somewhat flattened and bent dorso-laterally. Toward the posterior end (text-figure 380) the whole parapodium is much more elongated and the posterior lobe is comparatively shorter.

The setæ are of three kinds, of which the hooded from the anterior end are the most diagnostic. These (text-figure 381) have a long, gently curved shaft, terminating in a head with several teeth, of which the ventralmost is the largest, while a hood covers more than half of the exposed portion of the seta.

The tenth parapodium showed a vertical row of setæ consisting of 4 acuminate, then 5 hooded, and lastly 1 acuminate. This arrangement seems to hold good for the anterior parapodia, though there may be differences in the number of each form of seta.

The acuminate setæ (text-figure 382) are much larger than the hooded, are gently curved to a sharp point and have a narrow wing. In the posterior region of the body only hooded setæ occur, and these differ from those in the anterior region in that they are much longer, the shafts are larger, and the hood covers only the very tip of each shaft (text-figure 383). Under low power the apices of these setæ appear as shining white spots.

The maxilla (text-figure 384) somewhat resembles that of *L. floridana* (text-figure 369), but has a much shorter carrier. The forceps is slender, its halves not much curved. The proximal plates have each 4 large teeth, the next pair 2, and the distal ones 1 each. The mandible (text-figure 385) also somewhat resembles *L. floridana*, but has more sharply drawn brown lines in the basal portion. The halves are fused throughout practically their whole extent and the distal beveled portion is marked with prominent concentric brown lines.

In the Key West region specimens were collected at Long Key, Tortugas, and at Mangrove Key in Key West Harbor. Porto Rico specimens were from Puerto Real.

Lumbrinereis nuchalis, new species.

(Plate 9, figure 5; text-figures 386 to 394.)

A rather large species with a prostomial width of 1.5 mm. and a body-width of about 2 mm. One specimen, which lacked the posterior end, retained approximately 300 somites and after preservation measured 230 mm. in length.

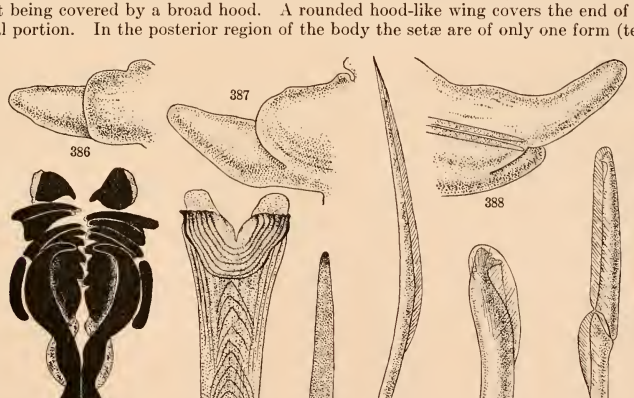
The body-color varies with the degree of distension of the blood-vessels; when these are filled with blood they give the body a beautiful purple color, when emptied it is rather grayish, but always with a brilliant iridescence, which may be golden. In preserved material the somites are marked with brownish transverse bands similar to those which appear in other species of this genus, but as these, in this case at least, are due to coagulated blood, they are of little systematic importance.

The prostomium (plate 9, figure 5) is large, its form varying with the degree of expansion. When fully expanded its lateral margins are nearly parallel for the first two-

thirds of their length and then converge to a rounded apex. The first somites are broader than the prostomium, but the maximum width seems to be reached at about the fifteenth somite. In the living animal the nuchal organs appear as deep hollows revealed by the frequent movements of the peristomial margin; in a specimen which had stood for some days in a laboratory dish these were partly everted, forming rounded lobes, one on either side, each marked by a bright-red median blood-vessel. A similar condition appears in *L. candida* (plate 8, figure 8). There are two pairs of thick, conical anal cirri.

The first parapodium (text-figure 386) has a rounded setal lobe and a very large post-setal one. Between the two is a vertical row of setæ, the dorsalmost simple with broad wings, then a number of compound with both basal and terminal portions hooded, and ventral to these other simple ones. I was unable to discover any acicula. On the dorsal surface is a small rounded lobe, in the preserved material covered by an expansion of the body-wall and easily overlooked, into which a few needle aciculæ extend. These lobes are shown in text-figures 386 and 387, and evidently represent the rudimentary dorsal cirrus. The tenth parapodium (text-figure 387) is very similar to the first in form. No aciculæ could be seen in the normal condition, but in a much flattened specimen there appeared a tuft of seta-like structures not larger than setæ, which terminate just inside the end of the setal lobe. These evidently function as aciculæ. A posterior parapodium (text-figure 388) has a more slender posterior lobe and there are two strong aciculæ. The one drawn had three hooded simple setæ.

The anterior simple seta (text-figure 389) is long, curved, and covered by a much striated hood. The compound setæ (text-figure 390) of the anterior region have long, slender terminal joints ending in two large and two or three smaller teeth, the whole terminal joint being covered by a broad hood. A rounded hood-like wing covers the end of the basal portion. In the posterior region of the body the setæ are of only one form (text-



TEXT-FIGURES 386 to 394. *Lumbrinereis nuchalis* Treadwell.

386. First parapodium ×55.
387. Tenth parapodium ×55.
388. Posterior parapodium ×55.
389. Anterior simple seta ×125.
390. Anterior compound seta ×210.
391. Posterior seta ×210.
392. Acicula ×410.
393. Maxilla ×22.
394. Mandible ×22.

figure 391). These are simple, stout, with long shafts, each terminating in a narrow "neck" and toothed "head." The distal surface of the largest tooth has a peculiar roughness which looks like a broken edge. Distal to this are other teeth, successively smaller toward the apex, the whole covered by a hood.

The aciculæ (text-figure 392) are slender, light brown in color, with a blunt apex.

The maxilla (text-figure 393) is dark brown with lighter margins. The carrier is long and slender, the forceps broad and much curved. As drawn, it is slightly turned, so that the broad surface is shown. The proximal toothed plates have each five teeth, of which the terminal one at the distal end is the smallest. These plates are curved at the apex, so that the terminal tooth is nearly on the same level as the forceps. The fourth tooth on the right-hand side had been broken in the specimen figured. The distal paired plates have 2 teeth and 1 tooth, respectively. Except for the single tooth on each of the distalmost plates, the apices of the teeth are covered with a colorless incrustation. Laterally all of the plates merge into a more or less colored plate of chitin, so that in the figures their lateral margins are rather arbitrarily drawn. The most noticeable of these colored areas are situated laterally to the forceps. The two halves of the mandible (text-figure 394) are fused for practically their entire extent, this portion being marked laterally by longitudinal brown lines and through the middle by concentric angular ones. These are really on the opposite surface of the mandible, where they show much more clearly than in the view drawn. The beveled portion is marked with concentric brown lines which are heaviest at their ends. There is an anterior prolongation covered with a whitish incrustation which is prolonged to a certain extent backward to cover the beveled part, more or less obscuring the lines.

Collected in April 1915, in sand, in Buccoo Bay, Tobago, where it was fairly common.

Type in the American Museum of Natural History.

Genus DRILONEREIS Claparède.

E. Claparède, Les Annélides chétopodes, etc., 1870, p. 399.

Body elongated, slender, without prostomial appendages, but sometimes with eyes. Parapodia with a rudimentary dorsal cirrus and two sorts of simple setæ, but without compound or hooked forms. Anal cirri present. Maxillæ resembling those of *Arabella*, with long, slender, posterior processes on the carrier, the forceps much curved and sometimes denticulated at the base, the three pairs of terminal paired plates smaller and with fewer teeth than in *Arabella*. Mandible frequently absent, very small if present.

The genus was redefined by de St. Joseph (1888, p. 224), who thought that the absence of the mandible, the difference in the form of the paired plates, and the much-curved forceps separate it from *Arabella*. The species I have listed as *D. attenuata* differs from the description in that the second pair of plates beyond the forceps are not simple hooks, but have several teeth, a character which possibly should put this species under *Arabella*. The prostomium is usually characteristic in that it is much flattened dorso-ventrally.

Drilonereis attenuata Treadwell.

(Plate 9, figures 6 to 9; text-figures 395 to 399.)

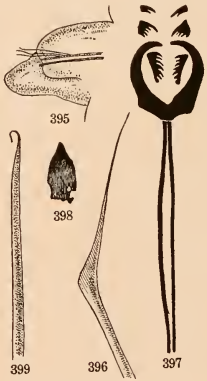
Aracoda attenuata Treadwell, 1911, p. 5, figures 8–11.

An extremely slender animal. The specimen figured was 175 mm. long, 0.33 mm. wide, and had 875 somites. In life a faint yellow or flesh color shading toward light green toward the extremities. In alcohol it is a light brown, but in many somites a darker brown band encircles the somite at the level of the parapodia (plate 9, figures 6–9).

The prostomium (plate 9, figure 7) is oval and capable of considerable changes of form. On either side near the posterior end are eye-spots which may be covered by the overlapping border of the peristomium. There are no cirri. The pygidium has two equal paired lobes (plate 9, figure 9).

The parapodia begin on somite three (this was erroneously given as four in my earlier paper). They are all alike in form, each having a bluntly ending setal lobe and a longer postero-ventral one (text-figure 395). The figure was drawn from the dorsal surface. Parapodia were absent from a considerable extent of the posterior region and here the somite boundaries are very difficult to distinguish. The simple setæ (text-figure 396) have relatively stout shafts, the terminal portion bent at an angle of 45° with the shaft and narrowing rapidly to an acute tip. Along the angle are many fine denticulations. A very few much smaller setæ occur, whose tips just protrude from the surface (text-figure 399). No distinct aciculæ were found, but if present it would be difficult to distinguish them from broken bases of ordinary setæ.

The maxilla (text-figure 397) is jet-black, with a very long bifid carrier, the forceps fused at the base and much curved. The first pair of plates have each 6 teeth, the second pair 4, and the third 2. I was unable to find any mandible, though there is a chitinous plate (text-figure 398) in the wall of the pharynx.



Text-figures 395 to 399.
Drilonereis attenuata Treadwell.

395. Parapodium ×247.
396. Seta ×394.
397. Maxilla ×102.
398. Ventral plate ×102.
399. Secondary seta ×310.

D. attenuata is difficult to collect because the animals live in small passages in the hardest of the coral rock, and it is not easy to break the rock without injuring them. Frequently on splitting the rock the animal will be seen stretched across from one piece to another like a fine thread. The one figured was the first entire specimen obtained in three seasons of collecting. The minute passages in the rocks so nearly fit the bodies that it seems as if they must be made by the animals. Experiments indicated the presence of an acid secretion in the skin which may possibly have a function in this process.

This species is common in the Dry Tortugas, Porto Rico, Montego Bay, Jamaica, and Tobago. One specimen was dredged off Sand Key, in Key West Harbor.

Drilonereis spatula Treadwell.

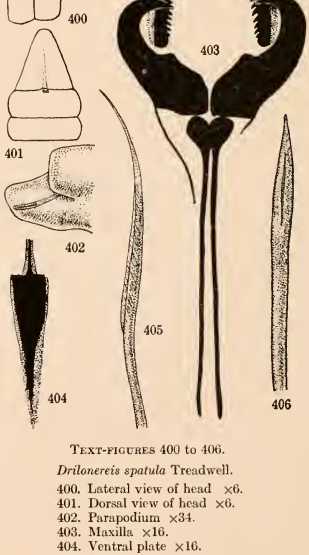
(Text-figures 400 to 406.)

Aracoda spatula Treadwell, 1911, p. 6, figures 12–14.

Collected at the Dry Tortugas and at Mangrove Key in Key West Harbor. At the time it was not differentiated from a lot of *Arabella* and *Lumbrinereis* that were collected with it, and since I was busy with other genera no drawings were made of the living animal and no notes of the coloration. In alcohol the body is of a uniform dark-brown color, becoming slightly lighter toward the posterior end. Some somites show a median dark band. The prostomium (text-figures 400 and 401) is very much flattened dorso-ventrally, is about 2 mm. broad at the base, and 2 mm. long. No eyes were visible, but near the anterior border of the peristomium there is a pair of shallow pits (sense-organs?).

The first two somites are short but wider than the prostomium, and then the body widens to about 4 mm. for the greater part of its length. The parapodia begin on the third somite and are at first very small, but gradually increase in length on later somites. They first assume a definite, easily distinguishable form on somite 23, but increase in size posterior to this. Each (text-figure 402) has a broad base of attachment, equal in width to the length of the parapodium, and carries a large ventro-posterior lobe. There is a tuft of slender bilimbate setæ and a single large protruding acicula.

Each half of the carrier of the maxilla is oval (text-figure 403) and is continued posteriorly as a long, slender rod. The forceps is large and heavy, its terminal portions much curved and with a very slender rod running posteriorly from the base. This was broken on the right side. Each of the next pair of plates has 7 teeth, and on either side beyond this are 2 plates, each with a single tooth; the distal plate is slightly smaller than the other. Ventrally is a black mandibular



TEXT-FIGURES 400 to 406.

Drilonereis spatula Treadwell.

400. Lateral view of head ×6.
401. Dorsal view of head ×6.
402. Parapodium ×34.
403. Maxilla ×16.
404. Ventral plate ×16.
405. Seta ×100.
406. Acicula ×100.

plate of the form shown in text-figure 404, but with very indefinite outlines. This I consider similar to the plate shown in text-figure 398, and not homologous with the mandibles of other genera. I was unable to find any true mandibles.

There is but one form of seta (text-figure 405). This is rather small, much curved toward the apex, and with a narrow wing along the convex margin. Each parapodium has a strong acicula extending to some distance beyond the setal lobe. Each acicula has a narrow lanceolate apex with a shallow longitudinal groove on its surface (text-figure 406).

One specimen had 338 somites and was 365 mm. long. Apparently the posterior end was entire, but I could find no trace of anal cirri or lobes.

Type in the American Museum of Natural History.

Drilonereis longa Webster.

TEXT-FIGURES 407 to 411.

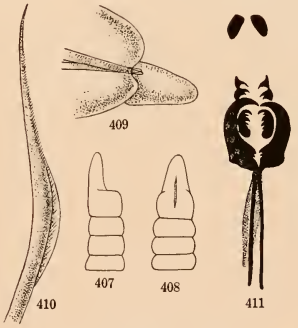
Drilonereis longa Webster, 1879, p. 40, plate VII, figures 84–88.
Laranda longa McIntosh, 1885, p. 237, plate XXX, figure 10; plate XXXVII, figure 5; text-figure 3.

A very slender species, looking very like *D. attenuata* and very similar to it in size. The body is less than a millimeter in width, and there are several hundred somites. Only the anterior portions of two specimens were collected at Mangrove Key in Key West Harbor in July 1915.

The prostomium (text-figures 407 and 408) is more pointed than *D. attenuata*, and there are no eyes. The boundary between the prostomium and the peristomium is very indistinct on the dorsal surface, but more marked laterally. In the median dorsal line is a longitudinal groove, extending over the prostomium and the first somite. Later somites are a little wider than the first, but not quite so long. I did not find the posterior end.

The parapodia are practically absent in the anterior somites, being represented by a very slight elevation carrying setæ. Later they become more prominent, and through the middle of the body have a relatively rather heavy posterior-ventral lobe (text-figure 409). Webster (*loc. cit.*, p. 40, and plate VII, figure 86) describes a second lobe, which appears only in posterior somites. This did not appear in any of my material and probably the specimen did not retain enough of the posterior regions to show this structure. The parapodium contains a pair of heavy aciculæ and simple setæ of two kinds. One (text-figure 410) is expanded and bent toward the apex, tapering to a sharp point and with a wing along the convex margin. Beyond the wing the margin is provided with a row of very small but clearly marked teeth. The second form of simple setæ are very slender and needle-like.

The maxilla (text-figure 411) has a long, slender carrier with rather stout forceps, much curved at the ends, and with teeth along the inner edge of the basal portion of each half.



TEXT-FIGURES 407 to 411.

Drilonereis longa Webster.

407. Lateral view of head ×18.
408. Dorsal view of head ×18.
409. Parapodium ×200.
410. Seta ×666.
411. Jaw apparatus ×26.

The proximal plates have each 5 teeth, the second 2, and the third 1. I regard as the mandible two small black chitinous plates lying anterior to the maxillæ in the wall of the pharynx, shown in their relative position in figure 411.

My specimens agree in all essential points with Webster's description. McIntosh (*loc. cit.*) identified as belonging to Webster's species a specimen dredged on the *Challenger* Expedition at station 47, off the coast between New York and Halifax, latitude 41° 14′ N., longitude 65° 45′ W., in 1,340 fathoms. McIntosh's specimen had 3 teeth in the second maxillary plate, Webster's had 1, and the Key West specimens had 2. If the identifications are correct, this character is a variable one. McIntosh's specimen also had lost the posterior end, so that it was not possible to confirm Webster's account of the bifid parapodium. On account of the structure of the parapodium and the toothed base of the forceps McIntosh thought his specimen should be classed as *Laranda*,

More recently, McIntosh has described as variety *elisabethæ* of this species (1910. p. 393, plate LXII, figures 7, 7*a*, 7*b*; plate LXXIV, figure 4; plate LXXXIII, figures 1 and 1*a*) specimens taken from the stomachs of fish at St. Andrews and southwest of Ireland, in 40 fathoms. He returns to *Drilonereis* as the generic name instead of *Laranda*, as in his earlier paper. This variety differs from the descriptions of *Drilonereis longa* in that it has eyes, that there is a prominent dorsal lobe on all but the first few parapodia, and in the character of the jaw apparatus. These seem to be characters of specific value and it does not seem accurate to list it as a variety of *longa*.

Webster's specimens of *D. longa* were collected in Northampton County, Virginia, between the mainland and the outlying islands, "in mud and sandy mud," and were reported as abundant. It was recorded by Andrews (1891, p. 288) as common in sand at Beaufort, North Carolina.

Drilonereis pinnata, new species.

(Plate 8, figure 11; text-figures 412 and 413.)

A large species of this genus, the one from which the figure was drawn being 2 mm. in body diameter. The type was much smaller, having a body diameter of 0.5 mm., a length of 300 mm., with over 700 somites.

The prostomium (plate 8, figure 11) has the flattened form characteristic of this genus and carries a pair of eyes which are usually drawn back under the margin of the peristomium, but are visible when the latter is retracted. A characteristic feature of the prostomium is the peculiar pinnately branched markings on the dorsal surface (plate 8, figure 11), which possibly represent blood-vessels. These form a series of straight lines arising at an angle from either side of a central axis. The body has little pigmentation, but is more or less colored by the blood and has a considerable surface iridescence, these tints being strongest throughout the middle region. The prostomium is about as wide as later somites and there is a gradual increase in width up to the middle of the body. There are two pairs of anal cirri, one pair much larger than the other.

Unlike the usual rule in this genus, the parapodia are prominent from the first. Each has a short setal lobe, containing a single acicula, a tuft of simple setæ, and a long posterior

412 413

TEXT-FIGURES 412 and 413.

Drilonereis pinnata
Treadwell.

412. Simple seta ×210.
413. Jaw apparatus ×55.

lobe. The setæ (text-figure 412) are long and slender, sharp-pointed, with a narrow wing. Both axis and wing are striated.

The maxilla (text-figure 413) has a very slender carrier prolonged into slender rods. The forceps is feebly denticulated at the base, the halves much curved. The proximal paired plates have each 5 teeth, the second pair 4, and the third pair 2. A dark-gray triangular patch of chitin is attached to the base of the carriers. A pair of black plates are attached to the wall of the pharynx and probably represent the mandible. The figure shows their position with respect to the maxilla when in place in the pharynx.

Collected in April 1918, on Buccoo Reef, Tobago.

Type in the American Museum of Natural History.

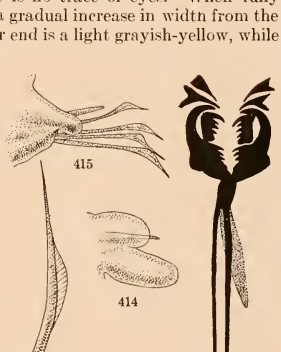
Drilonereis similis, new species.

(Plate 8, figure 12; text-figures 414 to 417.)

A medium-sized species of this genus, reaching a width of 0.75 mm.

The prostomium is long and conical and there is no trace of eyes. When fully extended (plate 8, figure 12) the anterior end shows a gradual increase in width from the prostomium back for about 30 somites. The anterior end is a light grayish-yellow, while farther back in the body there is more color, due to the blood in the vessels. There is very little iridescence. The black maxillæ can be seen through the translucent body-wall and are often protruded from the mouth.

The parapodia are practically not present in anterior somites, the setæ arising from the body-wall. When developed (text-figure 414), the parapodium has a prominent posterior lobe, a rounded setal one from which an acicula protrudes, and a tuft of setæ. A parapodium from the posterior end of the body (text-figure 415) has the posterior lobe as a rounded knob with a very heavy acicula extending to a considerable distance from the surface of the setal portion. There are a few stout setæ. The setæ are all similar in form; each (text-figure 416) has a shaft, curved toward the apex, which is sharp-pointed and has a rounded wing on the convex surface; they somewhat resemble the setæ of *D. brunnea*, but have a shorter wing.



TEXT-FIGURES 414 to 417.

Drilonereis similis Treadwell.

414. Anterior parapodium ×80.
415. Posterior parapodium ×80.
416. Seta ×380.
417. Maxilla ×55.

The maxilla (text-figure 417) has an elongated carrier with slender basal processes and a brown, ventrally attached plate. The forceps has heavy bases with prominent teeth on the inner margins and with slender terminal portions. The proximal paired plates have each a very large tooth at the distal end with a row of three smaller ones proximal to it. The second and third paired plates have each one tooth.

Collected in April 1918, at Petit Trou Lagoon and at Buccoo Reef, Tobago.

Type in the American Museum of Natural History.

Drilonereis brunnea, new species.

(Text-figures 418 to 420.)

A large species for this genus, the type specimen measuring, after preservation, 275 mm. in length, and containing approximately 440 somites. The prostomium is 1 mm. wide at the base, tapering to about one-third of that width at the apex. The

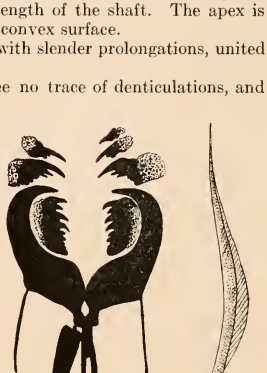
first somite is 1.5 mm. wide and is not sharply separated from the prostomium. There is a gradual increase in width to the end of the anterior third of the body, where it is 2 mm. wide. The living animal much resembles *Lumbrinereis* or *Arabella*, with which it occurs in the sand, but is much darker brown in color than either of these. After preservation the anterior end is light brown with some iridescence, but in the region of somite 40 this coloration becomes much deeper and the iridescence is less marked. The extreme posterior end is a lighter color. The pygidium was regenerating in all specimens collected, and therefore I have no information concerning the anal cirri. No drawing of the living animal was obtained.

In the anterior portion of the body the parapodia practically do not exist, the setæ arising in a tuft from the side of the body. In the region of the forty-fifth somite the parapodia become recognizable, each with a minute posterior lobe. Farther back this lobe increases in size and becomes more prominent than the setal portion. Text-figure 418 is taken from a parapodium posterior to the one-hundredth. A single heavy, pointed acicula protrudes to a considerable distance from the apex of the parapodium and there is a tuft of simple setæ. The setæ (text-figure 419) are similar throughout the entire extent of the body, differing only in the length of the shaft. The apex is curved, sharp-pointed, and has a large wing along the convex surface.

The maxilla (text-figure 420) has a small carrier with slender prolongations, united near their middle by a brownish plate of chitin.

The forceps has heavy bases on which I could see no trace of denticulations, and each base carries on its outer posterior angle a slender rod directed posteriorly. The apex of each half is much bent and is sharp-pointed.

The paired plates are noticeably merely the darkened and toothed inner margins of chitinous sheets which extend laterally, becoming much lighter on the side away from the teeth. I have drawn only the pigmented portions. These are curved so that their appearance varies with their position. In the normal position they are bent upward or toward the observer, and in this position their inner margins appear smooth. I have represented them as they appear when rolled so as to show the teeth. The proximal plates have a terminal large tooth, then one smaller one, then two larger followed by two smaller ones. The plates of the second and third pair have each a large terminal tooth with at least two much smaller ones, and these are followed by minute denticulations of the margin. In the specimen figured there was a single unpaired plate distal to the third right paired one, but this did not appear in another specimen dissected at the same time. A triangular plate of dark chitin is attached to the ventral surface of the carrier, but there is no trace of mandibular plates.



TEXT-FIGURES 418 to 420.

Drilonereis brunnea Treadwell.

418. Parapodium ×80.
419. Seta ×210.
420. Maxilla ×55.

Collected in April 1918, in sand, in Buccoo Bay, Tobago.

Type in the American Museum of Natural History.

Genus ARABELLA Grube.

A. E. Grube, Die Familien der Anneliden, etc., 1851, p. 45.

Body elongated, slender, without prostomial appendages or gills, with rudimentary dorsal and anal cirri. Two somites without setæ, the first forming the posterior border of the mouth. Maxilla with carrier prolonged into very long, slender processes, the forceps plate toothed at the base. Three pairs of terminal toothed plates, of which the proximal pair are much the largest. Sometimes the two proximal plates are unlike in size, but this does not always occur. There is sometimes a fifth pair of plates, each with one tooth. Mandible with shafts slender, pointed, and rather widely separated. Usually with eyes on the prostomium. Only simple setæ present in any part of the body.

This generic name was proposed by Grube as either a distinct genus from *Lumbrinereis* or a subgenus under it. By later writers (Schmarda, 1861, p. 115) a genus *Aracoda* was founded, though the distinction between this and other genera is not clear from Schmarda's description. He states that it may have 8 or 10 jaws (4 or 5 pairs). de St. Joseph (1888, p. 229) groups as *Aracoda* those with 5 pairs of jaws and 1 achætous somite. Ehlers (1864–1868, p. 281) distinguishes *Aracoda* by the possession of 5 pairs of jaws, but later (1887, pp. 111 and 112) he states that anterior teeth may separate from a plate and thus appear to be a distinct plate; hence the precise number of plates is not a good criterion. Ehlers's *Aracoda dentata* (1887, p. 112, plate 34, figures 8, 9, and plate 35, figures 1–4) is an *Arabella* and his *Aracoda debilis* (1887, p. 113, plate 35, figures 5–8) is a *Drilonereis*. Gravier (1900) makes the possession of 4 and 5 plates in the maxilla and 2 and 1 achætous somites, respectively, the distinction between *Arabella* and *Aracoda*. Neither of these criteria seems to me a valid one, and I would merge *Aracoda* with *Arabella*. McIntosh (1910, p. 395) apparently reaches a similar conclusion.

As I have stated earlier, it seems to me probable that there are always two achætous somites, though in some cases, owing to partial fusion, and in others, owing to imperfect preservation, the distinction between the two is not clear. *Arabella* also may have either 4 or 5 pairs of plates in the maxilla.

Arabella setosa, new species.

(Plate 9, figures 10 and 11; text-figures 421 to 424.)

A medium-sized species. The type was 130 mm. in length, with a prostomial width of 0.5 mm. The greatest body width was 1.5 mm.

The body shows no especially characteristic coloration beyond that due to the contained blood and the surface iridescence, which are not noticeably different from other members of this genus and from *Lumbrinereis*. Preserved specimens show dark transverse bands, which are due to coagulated blood and have little or no diagnostic significance.

The prostomium (plate 9, figure 11) is conical and has two pairs of eyes; the outer are the larger and are often less distinct, as if they were under a deeper layer of epidermis; one of the two inner eyes is often double. The peristomium is usually wider than the prostomium, but this condition varies with the degree of expansion. Later somites behind the first increase in width to about the middle of the body. There are two pairs of short conical anal cirri.

The parapodia are all similar in form and are prominent from the very first. The tenth (text-figure 421) has a short basal portion with a long posterior lobe. A tuft of very stout setæ extends from the setal portion. I could find no aciculæ.

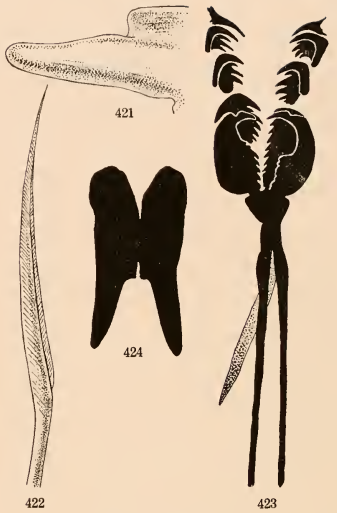
The setæ (text-figure 422) are similar throughout, each with a stout shaft bent and somewhat flattened toward the end, the flattened portion being noticeably striated. There is a narrow, colorless wing, the axial portion being yellowish brown. The setæ

vary in width, the one figured being one of the narrowest.

The maxilla (text-figure 423) has very long basal stalks, tapering to sharp points at the ends. Only about two-thirds of their length is represented in the figure. The halves of the forceps are unlike in form, but both are rather heavy and both have basal denticulations. The proximal paired plates are also unlike; the right one is much the larger and has 9 teeth, the terminal portion being so curved that it hooks over the terminal part of the forceps. The left plate has 6 teeth and is also hooked over the end of the corresponding forcep. The second and third paired plates are concave, the terminal tooth being the largest and lying at a higher level than the others. There are 7 unequal teeth on the right and 4 on the left in the second pair, while the third has 5 on the right and 4 on the left. The fourth pair of plates have each 1 tooth. The mandible (text-figure 424) is rather heavy, the two halves joined for about one-half their length and with short basal stalks.

Collected in Petit Trou Lagoon and in Buccoo Bay, Tobago, and in Montego Bay, Jamaica.

Type in the American Museum of Natural History.



TEXT-FIGURES 421 to 424.

Arabella setosa Treadwell.

421. Parapodium ×80
422. Seta ×210.
423. Maxilla ×30 (terminal third of shaft not figured).
424. Mandible ×30.

Arabella maculosa Verrill.

(Plate 9, figures 12 and 13; text-figures 425 to 428.)

Arabella maculosa Verrill, 1900, p. 651.

Verrill's type specimen, now in the Yale Museum, is 95 mm. long, but the posterior end seems to be regenerating. There are 162 somites in front of the regenerating portion. Most of the body is colorless (in alcohol), but in the middle region there is a transverse purplish brown band in the middle of each somite. The head is blunt sugar-loaf in shape, and the eyes are very indistinct, though agreeing in general with Verrill's description.

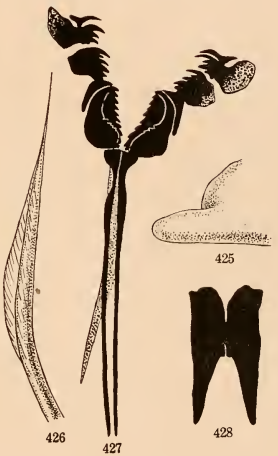
One specimen, collected by dredging in the Northwest Channel at the Dry Tortugas in 1914, agreed in general with Verrill's description of the color characters. The head was a prominent sugar-loaf in form, very iridescent, and with four eyes, the outer pair larger and slightly posterior to the inner. Verrill describes their relative positions as the reverse of this, and others that I found agreed with his description. Apparently there is some variation in this respect. The peristomium is about half as long as the prostomium and has a row of green spots on either side. There is a larger green spot on its dorsal surface, overlapping onto somite 2. Somite 2 is a little shorter than somite 1,

and later ones gradually become longer until about the thirty-fifth somite, but behind this they are of practically uniform widths until near the posterior end. Beginning with the first somite, becoming more noticeable in the region of the tenth, and disappearing entirely by the forty-third somite are green spots in each somite. These are arranged in a dorso-median, an admedian, and a lateral row, there being two spots in each row, the anterior one usually the larger. There is a transverse row of narrow lines in each somite, just anterior to the middle. In one Bermuda specimen, apparently of this species, I was unable to see any of the transverse rows of spots described by Verrill.

In preserved material the color disappears, the most noticeable coloration being the transverse brown band in each somite. This is true of Verrill's type as well as of material from Key West and Bermuda. Figure 12, plate 9, was drawn from a Bermuda specimen, and figure 13 from specimens taken at Long Key, in the Dry Tortugas, in 1915. In neither case did the artist represent the green pigment. The head corresponds with the above description, but the relative position of the two pairs of eyes seems to vary. This is possibly dependent on the amount of contraction.

The parapodia (text-figure 425) are of uniform character throughout the body, varying only in size. Each has a prominent post-setal lobe and carries a very few setæ. The setæ are also uniform in character throughout the body; each (text-figure 426) has a short, moderately strong shaft, which flattens and curves abruptly and is then drawn out into a long, sharp point. At the curve are thin wings (one only shown in figure 426), which are noticeably striated and which sometimes show, apparently as a result of pressure, roughened or toothed edges.

The maxilla (text-figure 427) has the two long basal rods characteristic of the genus, with ventrally a light-brown thickening of the chitin. The forceps has on either half a thickened toothed base and a slender, slightly curved terminal portion. Each first paired plate has about 10 teeth, in the second pair each has 5, in the third each has 4, in the last each has 1 very slender tooth. The alternation of long and short teeth in these plates shown in the figure seems to be a very characteristic and constant feature.



TEXT-FIGURES 425 to 428.

Arabella maculosa Verrill.

425. Middle parapodium ×55.
426. Seta ×395.
427. Maxilla ×34.
428. Mandible ×34.

The mandible (text-figure 428) is rather heavy, with slender posterior shafts and with the anterior edges rounded on the inner corners, but nearly square on the outer.

A. maculosa was rare in my Tortugas collections, but common in Bermuda, occurring with *Lumbrinereis maculata* in mud from a number of localities. Verrill's specimens were collected at Flatts Inlet, Bermuda.

Genus AGLAURIDES Ehlers.

Ehlers, Die Borstenwürmer, etc., 1864–1868, p. 408.

Prostomium with 3 short tentacles which may be entirely covered by the anterior border of the peristomium. Two lobes from the latter may cover over a part of the prostomium or may be retracted. Two pairs of eyes carried on the prostomium. The dorsal cirri are flattened plates. Carrier of the maxilla has long and slender basal processes and there are series of toothed plates which may or may not be symmetrical on the two sides. Mandible short and broad, the shafts making up a relatively small portion of the whole. Setæ in a vertical row between the two lobes of the parapodium, all simple.

Savigny (1820, pp. 13 and 14) defined *Aglaura* and *Oenone*. The main difference that I can discover between the genera is that *Aglaura* has three short tentacles ("couvertes"), while *Oenone* has "antennes comme nulle." This was interpreted to mean that the latter has no tentacles, and Ehlers (1864–1868, pp. 407 and 408) gives that as one of the characters of *Oenone*. Since *Aglaura* was preoccupied, he proposed the name *Aglaurides* in its place.

Benham (1915, p. 230, plate XLIII, figures 95–102; plate XLIV, figure 113) described as *Oenone* a species with three small tentacles covered by the border of the peristomium; he regards the asymmetrical arrangement of the maxillary plates as of more systematic importance than the tentacles. He thought that by "antennes comme nulle" Savigny really meant that they are too small to be readily seen.

Willey (1905, p. 284, plate IV, figure 106; plate V, figure 107) described as *Aglaurides fulgida* a species which had the covered tentacles and which he thought was similar to *Oenone diphyllidia;* but Benham (*l. c.*, p. 234) objects to this identification on the ground that the asymmetrical arrangement of the jaws puts this species in *Oenone*. Gravier (1900, p. 278, plate XIV, figures 99, 100) describes as *Aglaurides* a species in which the lobed organs behind the tentacles appear exactly as in my description (see below).

Fauvel (1917, pp. 252–254) reports a reexamination of several so-called species of *Oenone* and concludes that *Oenone* is not a valid genus, since all can be shown to have tentacles; the lobes figured by Savigny as overhanging the prostomium are capable of being retracted into pockets, and therefore do not always appear; there are two pairs of eyes; and in at least one species the maxillary plates are symmetrical. Since the genus *Oenone* was first used in connection with *O. lucida* by Savigny, and later study has shown that this was merely an immature stage of *Aglaura fulgida*, Fauvel thinks that Ehlers's amended genus *Aglaurides* should stand and *Oenone* be dropped from the literature.

The protrusible lobes mentioned above are not often seen in the specimens I have collected, and I at first thought them absent and the genus therefore not *Aglaurides*. Closer examination showed these lobes in a contracted condition behind the tentacles, and a living specimen under observation in Tobago in April 1918 protruded the lobes so far that they covered the tentacles.

Aglaurides diphyllidia Schmarda.

(Plate 7, figures 13 to 16; text-figures 429 to 434.)

Oenone diphyllidia Schmarda, 1861, p. 120, plate XXXII, figure 256.
Andromache diphyllidia Kinberg, 1864, p. 571.
Oenone diphyllidia Webster, 1884, p. 321.
Aglaurides diphyllidia Treadwell, 1916, p. 215.
Aglaurides erythraeensis var. *symmetrica* (?) Fauvel, 1914, p. 131, plate VII, figures 1–4; plate VIII, figures 38–41.
Aglaurides symmetrica (?) Fauvel, 1917, p. 252.
Not *Oenone diphyllidia* Ehlers, 1887, p. 109, plate 34, figures 1–7.

The body-color is a dark reddish brown (plate 7, figures 13–16), darkest at the peristomium, gradually becoming lighter farther back, though this general color per-

sists throughout the body. Beginning with the peristomium, each somite has numerous small light-yellow spots on its dorsal surface with a row of larger spots running across each somite a little in front of its median line. These never form a straight line, but are more or less zigzag in arrangement, though they never form two rows. The spots gradually become indistinct and finally disappear in the region of the twenty-fifth somite. An animal of average length was 150 mm. long with a peristomial width of 1.5 mm.; it had about 200 somites.

The prostomium (plate 7, figure 14) is rounded, with a very faint notch on its anterior border, and is colorless except for a patch of scattered yellowish-brown dots between the tentacles and the anterior border of the peristomium and a prominent yellow-brown patch antero-ventral to each eye. One pair of large, dark eyes, situated toward the lateral margin, and a much smaller pair near the middle line. These are often concealed by the tentacles when the anterior end of the body is expanded and when it is contracted they, as well as the tentacles, are covered by the anterior border of the peristomium. There are three tentacles approximately equal in size, which are entirely covered by the anterior border of the peristomium when the animal is contracted. Behind them are rounded lobes, not often protruded beyond the peristomial border. When undisturbed the prostomium is usually bent downward so that the tentacles are exposed. They usually extend straight up into the water instead of lying parallel with the prostomial surface (plate 7, figure 13).

The peristomium (plate 7, figure 14) is about as long as the two following somites. It is biannular ventrally, though not dorsally, and may represent two somites. The later somites increase noticeably in width to about the middle of the body, and from there backward the diameter diminishes, narrowing very abruptly at the posterior end. There are two pairs of stout anal cirri (plate 7, figure 16).

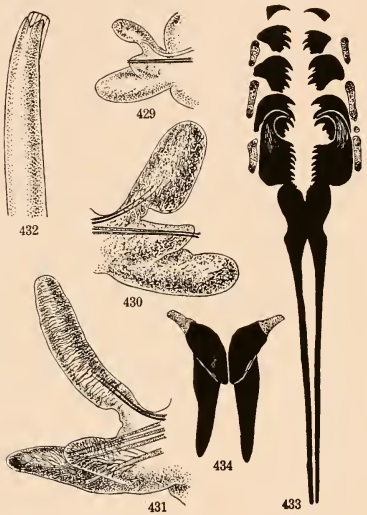
The first parapodium (text-figure 429) has a pointed post-setal lobe, a foliaceous dorsal cirrus, and a large oval ventral one. In the tenth parapodium (text-figure 430) the foliaceous character of the dorsal cirrus is more marked and the ventral cirrus is still more prominent, though it remains rounded and does not flatten, as do the dorsal ones. Parapodia from the middle and posterior regions of the body show this character of the dorsal cirrus even more markedly than anteriorly, and the ventral cirri are also very prominent throughout the body (plate 7, figure 15). Needle aciculæ occur in all dorsal cirri, and the post-setal lobes are long and conical (text-figure 431).

The setæ lie in a single vertical row between the setal lobes. The dorsalmost are the longest. They are slender, more or less curved, and without any lateral wing. Ventral to these are shorter ones which are gently curved and with a small wing along the margin. Toward the anterior end of the body two aciculæ are in each parapodium, and between somites 20 and 30 a ventral acicula makes its appearance. This (text-figure 432) tapers gradually to the bifid apex, which is covered by a small hood.

The maxilla (text-figure 433) has very long and slender bases on the carrier and the parts are strictly symmetrical. The first or forceps-plate on either side is attached to the carrier, its proximal portion is almost rectangular, with the inner margin produced into a row of 7 distinct teeth, with smaller denticulations posterior to them. The terminal portion of each forceps-plate is drawn out into a much-curved, sharp-pointed hook. The three following pairs of plates are successively smaller, but similar to one another in form. Each has a terminal large tooth, followed by a small one, then 2 large ones, and finally 2 very small ones. In the fifth pair each has only 1 tooth. Lateral to the plates, on either side, are 3 light-brown accessory plates. The mandible (text-figure 434, drawn from another specimen and on a smaller scale than the maxilla) has rather slender shafts, with the terminal beveled portion set at an angle of 45° with the shaft. This portion has a colorless extension on its outer angle.

When alive, *A. diphyllidia* may easily be recognized by its characteristic color and by the soft, slimy body, resembling in this respect the Phyllodocids. Like them, it secretes a mass of transparent mucus around itself when put into clean water, and it is usually found with more or less of this material clinging to it. It lives in crevices of the decaying coral rock.

Schmarda (1861, p. 120) lists this as *Oenone*. His diagnosis states that it has "tentacula duo minima (v. nulla)," but his figure plainly shows that by "tentacula" he meant palp. This was also pointed out by Ehlers (1864–1868, p. 407). At the same time, Ehlers demonstrates that a misunderstanding of these terms led Kinberg (1864, p. 571) to define a new genus, *Andromache*, for Schmarda's *Oenone*, on the assumption



TEXT-FIGURES 429 to 434.

Aglaurides diphyllidia Schmarda.

429. First parapodium ×33.
430. Tenth parapodium ×33.
431. Middle parapodium ×33.
432. Acicula ×310.
433. Maxilla ×20.
434. Mandible ×20.

that his specimen had two tentacles. Ehlers (1864–1868, p. 408) defines a new genus, *Cirrobranchia*, for members of this family having foliaceous dorsal cirri, 3 short tentacles, 1 pair of eyes, and 5 pairs of plates in the maxilla. Grube, however, showed (1878, p. 173) that this is synonymous with *Halla*, which has precedence.

At first I supposed this species to be identical with that described by Ehlers as *Oenone diphyllidia* (1887, p. 109, plate 34, figures 1–7), but it is entirely unlike it in the form of the maxillary plates. Ehlers figures no tentacles, and I found no indication of the tubes which he mentions as belonging to this species. The apparent lack of tentacles might have been an oversight, but the difference in maxillary structure puts Ehlers's animals in an entirely different species from mine. Schmarda's figure (1861, p. 120, text-figure) is evidently drawn from a mutilated specimen, but the number and arrangement of plates and teeth show a much more evident resemblance to my figure 5 than to Ehlers's figure 6,

so that I consider that mine is Schmarda's species, while Ehlers's belongs elsewhere. Fauvel (1917, p. 240, plate VI, figures 52–55) redescribes *Aglaurides fulgida* of Savigny, which he regards as synonymous with *Oenone diphyllidia* of both Schmarda and Ehlers. He gives also a considerable list of other synonyms. Although Fauvel remarks that Schmarda's text-figure of the maxilla "laisse fort à désirer," he thinks that the two descriptions were taken from the same species. I am unable to agree with this conclusion and think that Ehlers's specimen is not *diphyllidia*, but is probably, as Fauvel thinks, the same as *Aglaurides fulgida*. Fauvel described (1914, p. 131, etc.) as a variety *symmetrica*, of the species *A. erythraeensis* of Gravier, a form which agrees very closely with my specimens, especially in the structure of the jaw apparatus. I did not find the form of seta he figures in plate VIII, figure 40, and it seems to me it might have been a view of the ordinary winged seta in which both wings appeared. Later (1917, p. 252), Fauvel has decided that this is not a variety but a distinct species.

Schmarda's material was collected in Jamaica. The U. S. National Museum has specimens from St. Thomas and Curaçao, and I have collected them in the Dry Tortugas, Bermuda, and a single specimen in Tobago. Fauvel's were taken from St. Thomas, in the Gulf of Guinea.

Subfamily STAURONEREINÆ.

Genus STAURONEREIS.

Staurocephalus Grube, 1855, p. 97.
Staurocephalus Verrill, 1900, p. 647.

In a later paper (1860, p. 79) Grube redefined and corrected his original description of this genus. Meanwhile (1856, p. 60), he established the genus *Anisoceras* for a number of West Indian species, though he later (1879, p. 110) abandoned this genus and included all species under *Staurocephalus*. Verrill (1900, p. 647) showed that both names were preoccupied and proposed instead *Stauronereis*.

The prostomium is rounded, pentagonal or quadrangular, with two articulated tentacles and a pair of elongated palps, more or less spirally contorted. Body of comparatively few somites, the parapodia with dorsal and ventral cirri, but without gills. Four anal cirri. The maxillary apparatus is composed of two or more rows of toothed plates on either side, the rows diverging to form a V shape and united at the base by a relatively short V-shaped bar. The mandible is bifurcated, the shafts slender, with the cutting margin often prolonged laterally into rows of smaller plates.

Stauronereis polydonta Verrill.

(Plate 9, figures 14 to 16; text-figures 435 to 441.)

Stauronereis polydonta Verrill, 1900, p. 650.

This species was recorded by Verrill from Bermuda, but with a very incomplete description. Only two characters were mentioned, viz: the fact that it has more teeth than in the other Bermuda species of *Stauronereis*, and that "the compound setæ have very long, straight, minutely bidentate blades." He gives none of the color characters. Since my specimen agrees with this description as far as it goes, I have identified it as this species.

A specimen collected in July 1916, at Ely's Harbor, was about 25 mm. long, with a prostomial width of less than 0.5 mm., and had about 70 somites. The anterior end (plate 9, figure 14) was colorless, but throughout the greater part the body was colored a light pink, most noticeable in the intersegmental lines, while dorsally the surface was covered with a greenish-yellow pigment, arranged in granules as if stippled on. In the living animal the blood in the cirri contained in two distinct vessels gives them a reddish coloration.

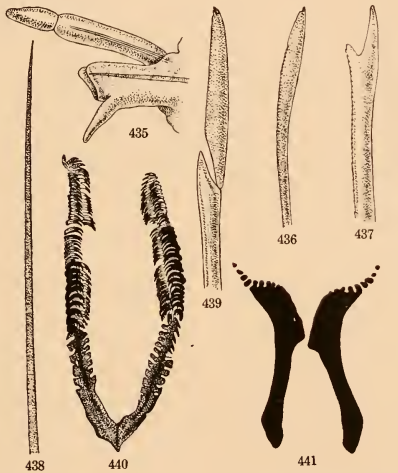
The prostomium (plate 9, figure 15) is rounded anteriorly, its length about equal to its width. The palps have a cylindrical basal joint, about twice as long as the prostomium, and a short terminal joint. The antennæ are shorter than the palps, each with about 12 joints. There are two pairs of eyes, of which the anterior are about twice as large as the posterior and twice as far apart. The peristomium is hardly larger than the following somite, and behind this is a gradual increase to about the middle of the body, then a gradual decrease to the posterior end. There are two pairs of anal cirri (plate 9, figure 16).

The first parapodium is very small, with a rounded ventral but no dorsal cirrus. Beginning with the second parapodium, the dorsal cirrus becomes prominent and is composed of a long basal and a much shorter terminal joint (text-figure 435 of the tenth). The setal lobe is elongated, with its apex drawn out into two equal dorsal lobes, between which the acicula protrudes. The ventral cirrus is very slender and is attached near the end of the setal lobe. Later parapodia throughout the body agree essentially with this in form.

The setæ are very small, those drawn being magnified nearly to twice the amount used for most of the other figures of setæ. The first parapodium has a dorsally placed,

very long and slender, simple seta with two much shorter ones, slightly widened toward the end, an indication of a terminal toothing, and denticulations along the convex edge (text-figure 436). In later somites these setæ are not represented, their places being taken by a somewhat stouter, unequally bifid one, strongly denticulated along the convex edge (text-figure 437). The simple setæ in these later somites are a little larger than in the first and are denticulated along the edge (text-figure 438). The compound setæ (text-figure 439) have long terminal joints with very delicate terminal teeth, difficult to demonstrate.

The maxilla (text-figure 440) consists of two rows of sharp teeth on either side, the teeth being more or less secondarily toothed. The basal portion is much heavier than in *S. rubra* and there are two double rows of separate teeth on either side distal to these. The mandible (text-figure 441) is more slender than in *S. rubra* and does not spread quite so widely.



TEXT-FIGURES 435 to 441.

Stauronereis polydonta Verrill.

435. Tenth parapodium ×90.
436. Seta from first parapodium ×666.
437. Seta from later somite ×666.
438. Simple seta ×666.
439. Compound seta ×666.
440. Maxilla ×90.
441. Mandible ×90.

Stauronereis rubra Grube.

(Plate 9, figures 20 to 23; text-figures 442 to 451.)

Anisoceras rubra Grube, 1856, p. 60.

A small species with an average length of 33 mm. and a width at the head of 2 mm. with 80 somites.

In life the body is light vermilion anteriorly (plate 9, figure 20), but this is largely lost behind the tenth somite, though a reddish tinge, due to intersegmental coloration, can be distinguished throughout the greater part of the body. Posteriorly there is very little color, and in general the appearance is due largely to the intestinal contents seen through the body-wall. All of the parapodia are colorless, and no color remains in preserved material.

The prostomium is rounded, almost hemispherical in outline when seen from above. There is one pair of articulated tentacles (plate 9, figure 21) having at least nine articulations, and also a pair of slender, tentacle-like palps, longer than the tentacles and not articulated, though their inner surfaces may be much wrinkled. There are two pairs of eyes, of which the ventral pair are the larger, and from a dorsal view are concealed by the bases of the tentacles. The dorsal eyes are small, black, on the median sides of the bases of the tentacles.

The peristomium (plate 9, figure 21) is a little broader than long, with its anterior edge a little narrower than the posterior, and with a thick margin which is recurved behind each tentacle and continued to the ventral surface, where it ends on either side in a thick, posteriorly directed swelling, the two forming an upper lip to the large mouth. Dorsally the anterior margin forms a backwardly directed depression, from the center of which a caruncle-like knob extends forward to nearly the level of the eye. The mouth is large, bounded dorsally by the lobes above mentioned, and ventrally by a prominent lip. Somite 2 is a little wider than the peristomium and about one-half its length (plate 9, figure 21). Succeeding somites widen a little for the first few, but later narrow gradually to the posterior end.

All the cirri are prominent, the dorsal ones with two joints and needle aciculæ, the ventral ones not longer than the parapodium and of uniform diameter, though rounded at the end. There are two pairs of anal cirri, the dorsal pair much the larger (plate 9, figure 23).

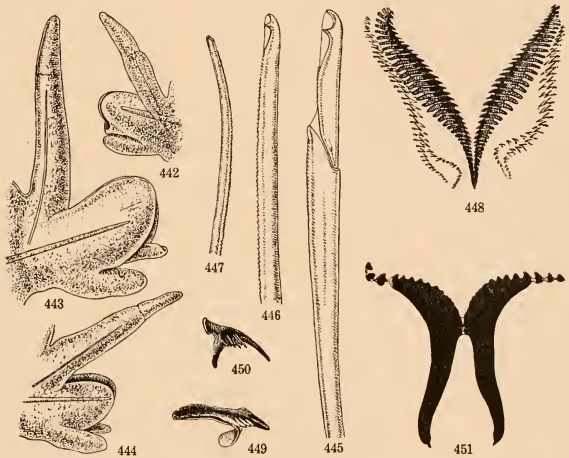
The antero-posterior diameter of all parapodia is about equal to the dorso-ventral. Each has a prominent post- and pre-setal lobe, the two being continuous ventrally, so that the setæ appear to arise from the bottom of a deep depression, bounded on three sides by a relatively high wall. The first parapodium (text-figure 442) has rounded anterior and posterior lobes and an inconspicuous ventral one. The dorsal cirrus is twice as long as the setal lobes, its two joints about equal. The ventral cirrus is about as thick as the dorsal and extends to only the end of the setal lobe. There are one or two aciculæ in the setal portion. The tenth parapodium (text-figure 443) and one from the posterior end of the body (text-figure 444) are very similar to the first in general form, though they have a distinct ventral lobe on the setal portion which is not present on the first. Their acicular equipment is essentially like the first.

The setæ are relatively long. The compound seta (text-figure 445) has a long basal joint, which widens near its apex and here has a series of denticulations along its convex edge. The terminal joint is relatively long, with an apical and a subapical tooth and a hood. The basal portion of this joint has denticulations along its convex edge. Simple setæ are of two kinds, both being found in the dorsal portion of the seta tuft. They differ in size, the larger (text-figure 446) having apical and subapical teeth, covered by a hood, and marginal denticulations. The smaller ones (text-figure 447) are more slender than the others, are denticulated on the margin, and with obscure teeth at the apex. These look as if well-developed teeth had been worn away, but since they occur in this form all through the body I have decided that they are entirely normal.

The maxilla (text-figure 448) has on either side two rows of black teeth, only the ventral row being figured. The dorsal ones are smaller and would lie directly behind these that are drawn. A slender chitinous rod unites the two sides of each row posteriorly. This is smooth at the junction, but toward its end shows indications of separation into minute teeth. There are from 30 to 35 teeth in each row, the largest in the middle, and they gradually become smaller from there toward either end; each tooth (text-figure 449) has a long solid basal portion, the terminal portion bent at an angle with the basal, the whole concavo-convex in form, the figure being drawn from the convex surface. At the apex is a stout tooth, with rows of smaller teeth on either side.

Laterally a thin wing connects each tooth with the adjoining one. The teeth of the dorsal row (text-figure 450) have a short basal portion, and two sharp arms extend out from this. Between the two arms is a series of sharp teeth. Lateral to the main rows are two other rows on either side. These are much smaller than the others and vary in color from light brown to black. The mandible is of two parts (text-figure 451), firmly held together on the median edges, the terminal portion broadened and toothed, and with a series of plates extending from the apex on either side.

S. rubra is rather common in crevices of rocks at the Dry Tortugas, most of my specimens coming from rocks near Loggerhead Key. I did not find it in Porto Rico or in Bermuda. One specimen was collected in Tobago and one in Montego Bay, Jamaica. Grube's single specimen was collected at St. Croix. It occurs in the outer crevices of the decaying rocks and does not penetrate deeply into them. Its body is very soft and easily injured. Possibly connected with this is the fact that regenerating individuals are often found, especially those regenerating the anterior ends.



TEXT-FIGURES 442 to 451. *Stauronereis rubra* Grube.

442. First parapodium ×40.
443. Tenth parapodium ×40.
444. Posterior parapodium ×40.
445. Compound seta ×387.
446. Simple seta ×387.
447. Simple seta ×387.
448. Maxilla ×32.
449. Single maxillary tooth ×92.
450. Tooth from dorsal row ×92.
451. Mandible ×32.

Stauronereis vittata Grube.

(Plate 9, figures 17 to 19; text-figures 452 to 458.)

Anisoceras vittata Grube, 1856, p. 61.

The specimen figured was dredged in July 1915, in broken coral sand, south of Tortugas buoy. It was an immature female, about 40 mm. long and with about 90 somites. The prostomium was rounded and colorless, with two pairs of eyes, the

anterior pair being much larger and slightly farther apart than the posterior. The palps are long and slender, slightly wrinkled on their posterior faces (plate 9, figure 18).

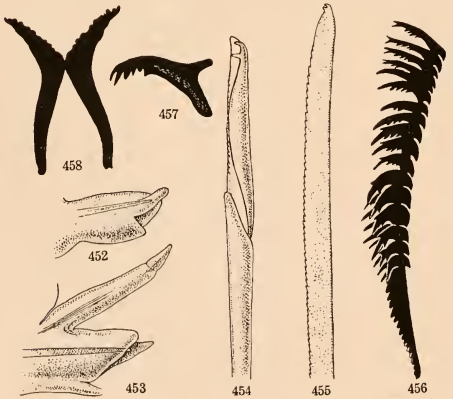
The tentacles are shorter and more slender than the palps, articulated throughout. The peristomium and first somite are marked with brilliant red bands, occupying a large part of their dorsal surfaces, while succeeding somites, as far back as the region of the eighteenth, have a narrow red line toward their anterior margins (plate 9, figure 18).

Beginning with somite 10 and extending to about the middle of the body, each somite carries a triangular white dorsal patch, with the apex directed anteriorly and running onto the somite in front. The remainder of the body is pale yellow. None of this color persists in preserved material (Plate 9, figure 19).

The first parapodium (text-figure 452) is without a dorsal cirrus, but has a prominent ventral one. There is a slender, cirrus-like posterior lip to the setigerous portion, and a large acicula extends into the latter just anterior to this lip. The later parapodia (text-figure 453 of the tenth) have prominent dorsal cirri, which in some cases seem to be jointed at the end, but this (possibly because of poor preservation) was not demonstrable in all somites. The cirrus contains a tuft of needle aciculæ. The setal lobe is beveled at the apex; there is a small posterior lobe and a slender ventral cirrus. Later parapodia do not differ in any important respects from the tenth.

Ventrally each parapodium has a tuft of compound setæ, showing a definite increase in length from the ventralmost toward the dorsal side of the tuft. They are slender, with a long, narrow, very decidedly bidentate end, and covered with a delicate hood which extends beyond the seta and is denticulated along the edge (text-figure 454). Dorsally there are two sorts of simple setæ, differing from one another mainly in their proportions. One is slender, very finely bidentate at the end and finely denticulated along one edge; the other is broader (text-figure 455), but with essentially similar denticulations and terminal teeth. There is a single, straight acicula, not penetrating the apex of the parapodium.

The jaw apparatus is similar in general outline to the other species of this genus. I was unable to mount an unbroken maxilla and the figure (text-figure 456) is of only a



TEXT-FIGURES 452 to 458.

Stauronereis vittata Grube.

452. First parapodium ×90.
453. Tenth parapodium ×90.
454. Compound seta ×666.
455. Simple seta ×666.
456. Part of maxilla ×65.
457. Single maxillary tooth ×305.
458. Mandible ×75.

part of one side. There are two basal pieces joined at their posterior ends and with large teeth along the inner edge (only one is drawn). At the end of this basal piece a double row of plates begins. The upper row is made up of larger plates, each with a central bent tooth, and on either side a smaller denticulation. Only six of these are figured. Below this row is a row of smaller plates with rather smaller teeth. Beyond the sixth plate the upper plates are not drawn, the lower ones being the only ones shown. Toward the outer end they gradually become more slender, their lateral teeth become more numerous and smaller, and they may become bifid at the end. Text-figure 457 is drawn from one of these from a Bermuda specimen, and this is rather stouter than any I found in the one from Tortugas. The Tortugas specimen had about forty plates in each row. Lateral to these rows of plates, on either side, are two rows of smaller plates, differing from them mainly in size. The mandible (text-figure 458), from a Bermuda specimen, is slender and with the anterior edge lobulated, but not continued in rows of smaller plates.

One specimen was collected by dredging in the Northwest Channel and one to the south of Loggerhead Key at the Tortugas, in 1913 and 1915, respectively, and one in Ely's Harbor, Bermuda, in 1916.

Stauronereis melanops Verrill.

(Text-figures 459 to 467.)

Stauronereis melanops Verrill, 1900, p. 648.

Length of body in preserved material about 20 mm. The prostomium width is 1 mm., the greatest body-width not over 2 mm.

The prostomium (text-figure 459) is uniformly rounded and a trifle wider than long. Verrill states that "a pair of divergent narrow-lanceolate ridges arises from the middle of the posterior margin." This I understand to be the structure figured, but which I should describe as a pointed elevation whose apex is at the middle of the posterior margin of the prostomium and whose margins diverge to end just behind the bases of the tentacles. The posterior pair of eyes lie just lateral to the sides of this elevation. The anterior eyes are much larger than the posterior and are largely concealed by the bases of the tentacles. The tentacles are longer than the width of the prostomium, are very obscurely articulated at the bases, but sharply so toward their ends. Verrill states that they have thirteen articulations. I was unable to determine the precise number on the material at my disposal, as it is difficult in preserved animals to distinguish articulations from wrinklings. The palps are much larger than the tentacles, not quite so long, and more or less wrinkled.

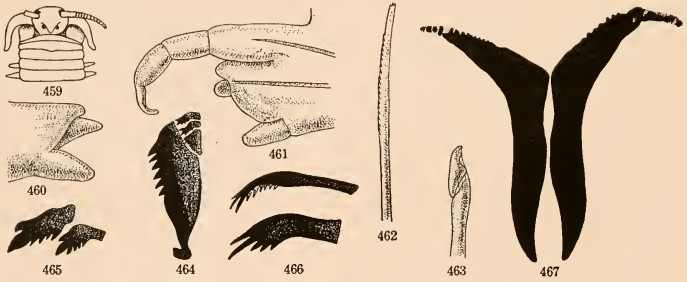
The first somite is divided on the dorsal surface by a ridge which runs transversely, separating a narrow anterior portion from the remainder. This anterior portion is broadest just behind the apex of the prostomial ridge, and narrows to a point on either margin of the body. Laterally the peristomium sends forward a heavy lobe on either side, which is separated from the prostomium by a depression. This is not continued onto the ventral surface. There are heavy, pad-like lips. The second somite is about as long as the peristomium, and succeeding ones increase very slightly in length. The greatest body-width is about at the middle, from which it tapers about equally in the two directions. Most of the anterior somites show a transverse ridge which may be a preservation effect. On preserved material there is a ventro-median row of brown spots, one to a somite. The terminal portion was not well preserved, but there were two pairs of anal cirri, one pair much larger than the other.

The first parapodium (text-figure 460) has a setal lobe whose margin curves upward to a conical angle. There is a conical posterior lip and a rather heavy ventral cirrus, with a rounded apex and somewhat longer than the setal lobe. There is no dorsal cirrus.

The tenth parapodium (text-figure 461) has a setal lobe shaped much like the first, and a rounded posterior lip, a little longer than the setigerous lobe. The dorsal cirrus is long and articulated, the basal joint longer than the setal lobe, the second joint more slender and about half as long as this, the terminal joint about as long as the basal, but very slender and acute at the apex. The ventral cirrus is much smaller than on the first parapodium. Later parapodia agree in general with this in structure, the chief difference being in the setal lobe, which becomes very long and slender. There is one large acicula in the setal portion and a single smaller one extends into the dorsal cirrus.

In all parapodia there are two tufts of setæ, the dorsal simple, the ventral compound ones. The simple setæ (text-figure 462) are very slender and toothed for a certain distance along one edge. Some seemed to be narrower and more curved than others, but no other differences appeared. The broader ones showed a very faint indication of a terminal notching into minute teeth, as in figure 462. The compound ones are very small, and there are two varieties; one (text-figure 463) has a rather heavy basal portion and a short and thick terminal joint, strongly bidentate at the apex and covered with a small hood; another has the shaft and terminal portions both more slender than this, the terminal portion being more than twice as long, relative to its transverse axis, as is the case with the one figured. They agreed in having a bidentate apex. The slender forms are more numerous in the tuft than the stout ones.

The maxillary apparatus has the V-shaped form found in this genus. I was unable to secure a drawing of the entire apparatus and figure only fragments. At the base (text-figure 464) is a stout plate united by a narrow neck with its fellow of the other side. On the inner margin of this plate, about half-way of its length, are several strong teeth. Lateral to it, near its apex, are small plates, each toothed at its inner end. Beyond this plate are two rows of plates, one row continuous with the teeth of the basal plate, the other continuous with the small plates shown in figure 464. Figure 465 shows the entire structure of the first pair of these plates. The inner ones are the larger, each with a heavy terminal tooth, a single large tooth on its distal margin, and a row of



TEXT-FIGURES 459 to 467. *Stauronereis melanops* Verrill.

459. Anterior end drawn from preserved material ×7.
460. First parapodium ×90.
461. Tenth parapodium ×60.
462. Simple seta ×334.
463. Compound seta ×334.
464. Basal portion of one-half of maxilla ×90.
465. Middle teeth of maxilla, inner ones on left, outer ones on right ×90.
466. Distal teeth of maxilla, inner ones below outer ones above ×90.
467. Mandible ×90.

smaller on its proximal margin. There are about 30 pairs of these plates in each half of the jaw, those near the end having the form shown in figure 466. Those of the inner row are much like those near the base, except that their teeth are longer and more slender. The outer-row plates become very long and slender and have about eight teeth.

The mandible (text-figure 467) is of the usual form, the parts being heavier than in *S. vittata* and with a variable number of denticulations along the anterior margins. Beyond the apex of each half are several small plates. The number of these small plates is apparently not constant in this genus, but the specimen examined showed 4 on one side and 3 on the other; the latter, however, looked as if there had been a fusion of two.

S. melanops did not appear in my Bermuda collections, and I am indebted to Dr. Crozier, of the Bermuda Biological Station, for a single specimen collected in Fairyland Creek. The specimen agreed with Verrill's diagnosis in most characters, differing in the shape of the head as described above; in the fact that he described the dorsal cirri as biarticulate, while this one had three articulations, and in the slightly greater number of plates in the jaws. Verrill gave 20 as the number in the type, while my specimen had as many as 30.

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DESCRIPTIONS OF PLATES.

Plate 1.

Leodice longicirrata Webster.
1. Entire animal, ×1.5, Ball del.
2. Head, ×6, Ball del.
3. Somites 40 and 41, ×6, Ball del.
4. Pygidium, ×6, Ball del.

Leodice unifrons Verrill.
5. Entire animal, ×2, Ball del.
6. Head, ×6, Ball del.
7. Somites 64 and 65, ×6, Ball del.
8. Pygidium, ×6, Ball del.
9. Gill-bearing somite, ×6, Fernald del.

Leodice stigmatura Verrill.
10. Entire animal, ×2, Ball del.
11. Head, ×4, Ball del.
12. Middle somites, ×4, Ball del.
13. Pygidium, ×4, Ball del.

Leodice filamentosa Grube.
14. Entire animal, ×1, Ball del.
15. Head, ×4, Ball del.
16. Somites from region of seventy-fifth, Ball del.
17. Pygidium, ×4, Ball del.

Leodice rubrivittata Treadwell.
18. Entire animal, ×4, Ridgway del. after sketch by Gay.

Plate 2.

Leodice rubra Grube.
1. Entire animal, ×3, Ball del.
2. Head, ×6, Ball del.
3. Middle somites, ×6, Ball del.
4. Pygidium, ×6, Ball del.

Leodice longisetis Webster.
5. Entire animal, ×1.5, Ball and Morita del.
6. Head, ×3, Morita del.
7. Middle somites, ×3, Ball del.
8. Pygidium, ×3, Ball del.

Leodice guanica Treadwell.
9. Anterior end, ×6, Rowland del.
10. Head of smaller individual, ×6, Rowland del.
11. Middle somites, ×6, Rowland del.
12. Pygidium, ×6, Rowland del.

Leodice culebra Treadwell.
13. Entire animal, ×3, Fernald del.
14. Head, ×6, Fernald del.
15. Middle somites, ×6, Fernald del.
16. Pygidium, ×6, Fernald del.

Plate 3.

Leodice denticulata Webster.
1. Entire animal, ×1, Ball del.
2. Head, ×4, Ball del.
3. Middle somites, ×4, Ball del.
4. Pygidium, ×4, Ball del.

Leodice mutilata Webster.
5. Entire animal, ×1.5, Ball del.
6. Head, ×6, Ball del.
7. Forty-fourth and forty-fifth somites, ×6, Ball del.
8. Pygidium, ×6, Ball del.

Plate 3—*Continued.*

Leodice binominata Quatrefages.
9. Entire animal, ×2, Ball del.
10. Head, ×4, Ball del.
11. Middle somites, ×4, Ball del.
12. Pygidium, ×4, Ball del.

Plate 4.

Leodice caribæa Grube.
1. Entire animal, ×1, Ball del.
2. Head, ×4, Ball del.
3. Middle somites, ×4, Ball del.
4. Pygidium, ×4, Ball del.

Leodice fucata Ehlers.
5. Entire animal, ×1, Ball del.
6. Head, ×2, Ball del.
7. Middle somites, ×2, Ball del.
8. Egg-bearing somites, ×2, Ball del.
9. Pygidium, ×2, Ball del.
10. Posterior end of egg-bearing female, ×3, Morita del.

Leodice tenuis Treadwell.
11. Animal lacking pygidium, ×1, Ball del.

Leodice notata Treadwell.
12. Entire animal, ×3, Gay del.

Lysidice sulcata Treadwell.
13. Entire animal, ×1, Ball del.
14. Head, ×6, Ball del.
15. Pygidium, ×6, Ball del.

Plate 5.

Marphysa acicularum Webster.
1. Entire animal, ×1, Fernald del., Bermuda specimen.
2. Head, ×4, Ball del., Tortugas speeimen.
3. Middle somites, ×4, Ball del., Tortugas specimen.
4. Pygidium, ×4, Ball del., Tortugas speeimen.

Marphysa acicularum var. *brevibranchiata* Treadwell.
5. Entire animal, ×1, Fernald del., Bermuda specimen.
6. Head, ×1.6, Fernald del., Bermuda specimen.
7. Middle somites, ×1.6, Fernald del., Bermuda specimen.
8. Pygidium, ×1.6, Fernald del., Bermuda specimen.

Marphysa regalis Verrill.
9. Entire animal, ×3, Rowland del., Porto Rico specimen.
10. Head, ×4, Ball del., Tortugas specimen.
11. Middle somites, ×4, Ball del., Tortugas specimen.
12. Pygidium, ×4, Ball del., Tortugas specimen.

Marphysa belli Audouin et *Milne Ed.* var. *oculata* Treadwell.
13. Entire animal, ×3, Weber del.
14. Gill-bearing somites, ×6, Weber del.

Plate 6.

Marphysa viridis Treadwell.
1. Entire animal, ×1.5, Weber del.
2. Head, ×3, Weber del.
3. Middle somites, ×3, Weber del.
4. Pygidium, ×3, Weber del.

PLATE 6—*Continued.*

Nicidion kinbergii Webster.
5. Entire animal, ×1.5, Ball del.
6. Head, ×4, Ball del.
7. Middle somites, ×4, Ball del
8. Pygidium, ×4, Ball del.

Marphysa nobilis Treadwell.
9. Entire animal, ×3, Weber del.
10. Head, ×6, Weber del.
11. Middle somites, ×6, Weber del.
12. Pygidium, ×6, Weber del.

Marphysa breviventaculata Treadwell.
13. Entire animal, ×1.5, Gay del.
14. Head, ×3, Gay del.

PLATE 7.

Onuphis magna Andrews.
1. Entire animal, ×1, Ball del.
2. Head, ×2, Ball del.
3. Middle somites, ×4, Ball del.
4. Pygidium, ×4, Ball del.
5. Larva, ×55, Ball del.

Lumbrinereis cingulata Treadwell.
6. Entire animal, ×3, Fernald del.
7. Head, ×7, Weber del.
8. Middle somites, ×7, Fernald del.
9. Pygidium, ×7, Fernald del.

Lumbrinereis nasuta Verrill.
10. Entire animal, ×3, Fernald del.
11. Head, ×6, Fernald del.
12. Middle somites, ×6, Fernald del.

Aglawrides diphyllidia Schmarda.
13. Entire animal, ×1.5, Gay del.
14. Head, ×4, Gay del.
15. Middle somites, ×4, Weber del.
16. Pygidium, ×4, Weber del.

PLATE 8.

Lysidice notata Ehlers.
1. Entire animal, ×3, Ball del.
2. Head, ×6, Ball del.
3. Middle somites, ×6, Ball del.
4. Pygidium, ×6, Ball del.

Lumbrinereis branchiata Treadwell.
5. Entire animal, ×2, Gay del.
6. Head, ×12, Gay del.

PLATE 8—*Continued.*

Lumbrinereis candida Treadwell.
7. Entire animal, ×3, Gay del.
8. Head, ×6, Gay del.
9. Middle somites, ×6, Gay del.

Lumbrinereis maculata Treadwell.
10. Head, ×4, Weber del.

Drilonereis pinnata Treadwell.
11. Entire animal, ×3, Gay del.

Drilonereis similis Treadwell.
12. Entire animal, ×3, Gay del.

PLATE 9.

Lumbrinereis paucidentata Treadwell.
1. Entire animal, ×1, Ball del.
2. Head, ×6, Ball del.
3. Middle somites, ×6, Ball del.
4. Pygidium, ×6, Ball del.

Lumbrinereis nuchalis Treadwell.
5. Entire animal, ×4, Gay del.

Drilonereis attenuata Treadwell.
6. Entire animal, ×6, Ball del.
7. Head, ×11, Ball del.
8. Middle somites, ×11, Ball del.
9. Pygidium, ×11, Ball del.

Arabella setosa Treadwell.
10. Entire animal, ×3, Gay del.
11. Head, ×5, Gay del.

Arabella maculosa Verrill.
12. Entire animal, ×1.5, Fernald del.
13. Head, ×4, Weber del.

Stauronereis polydonta Verrill.
14. Entire animal, ×4, Fernald del.
15. Head, ×9, Fernald del.
16. Pygidium, ×9, Fernald del.

Stauronereis vittata Grube.
17. Entire animal, ×3, Weber del.
18. Head, ×6, Weber del.
19. Middle somites, ×6, Weber del.

Stauronereis rubra Grube.
20. Entire animal, ×1.5, Ball del.
21. Head, ×6, Ball del.
22. Middle somites, ×6, Ball del.
23. Pygidium, ×6, Ball del.

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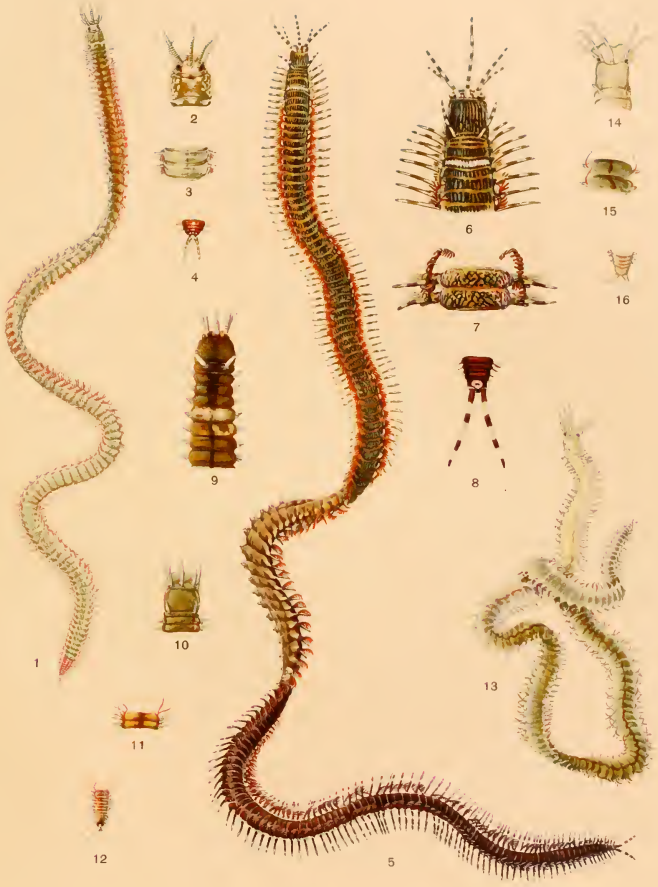

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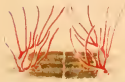

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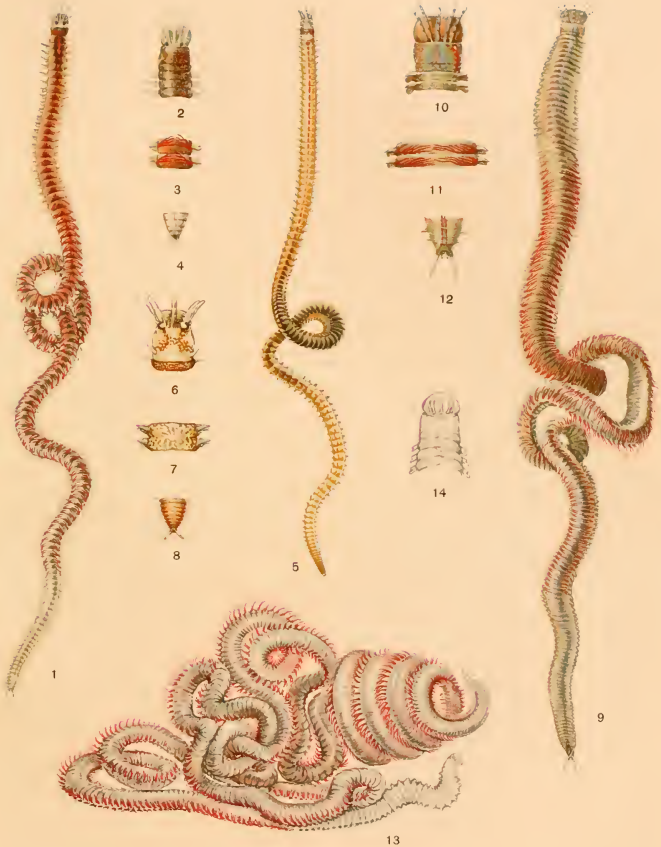

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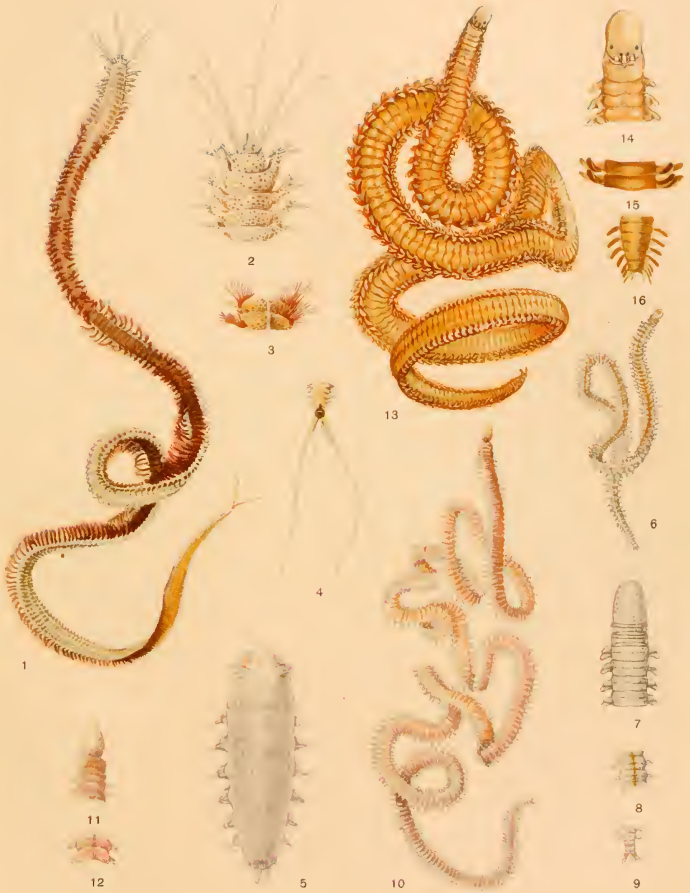

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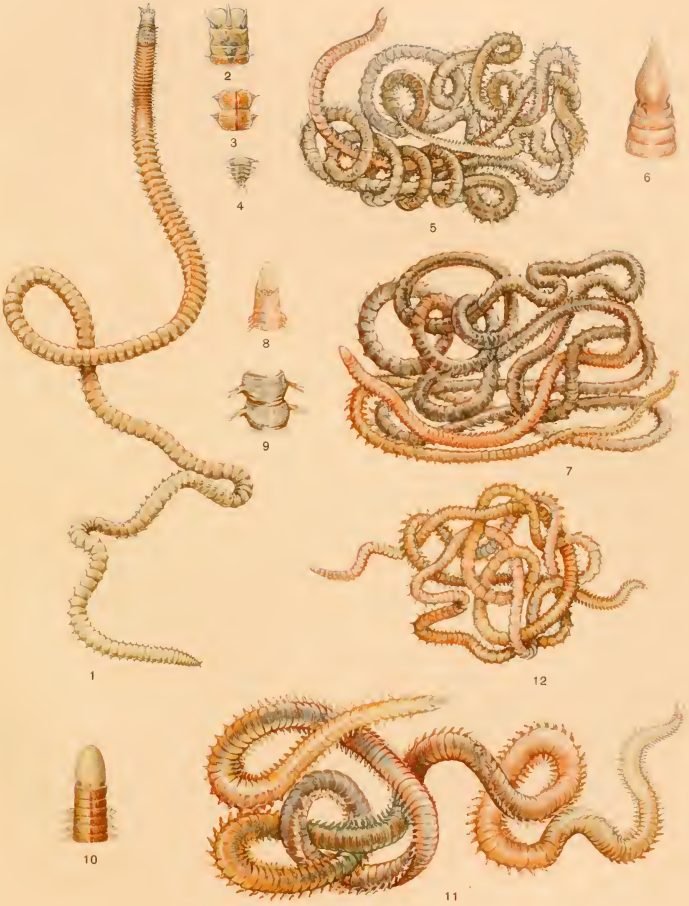

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